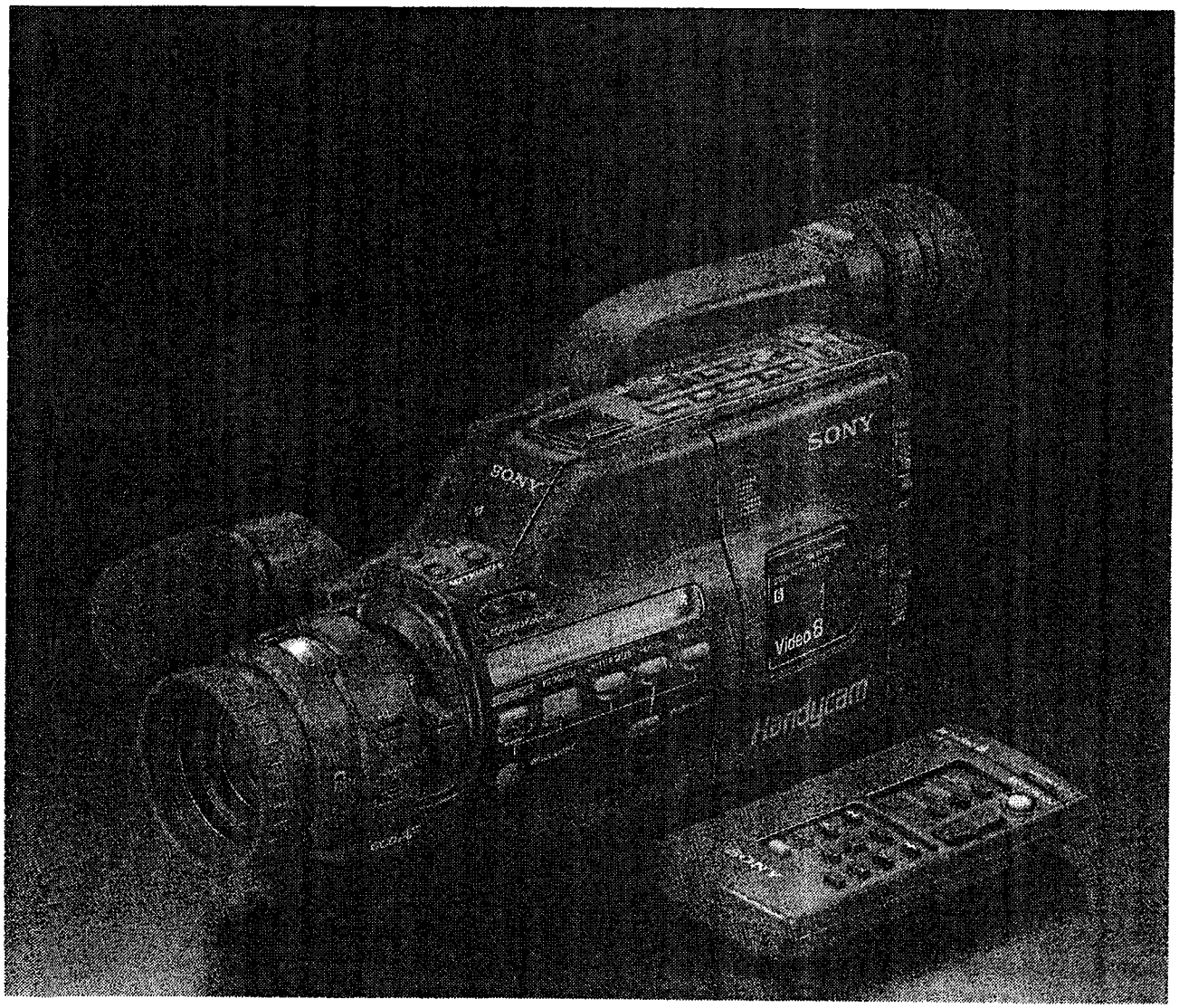
SONY

Video Camera Recorder 8

CCD-F401

Operating Instructions

Before operating the unit, please read this manual thoroughly and retain it for future reference.

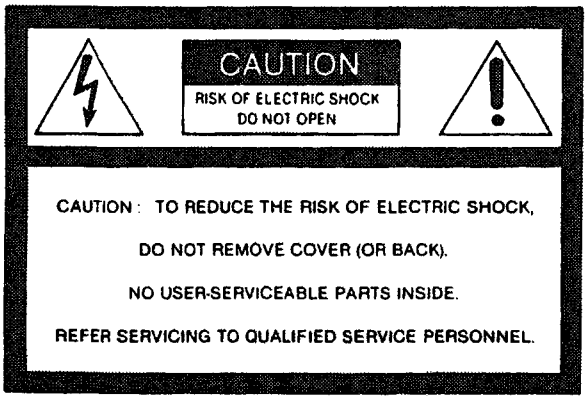


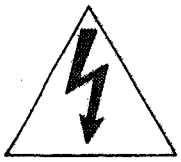
Video 8 Handycam

© 1991 by Sony Corporation

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION : TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Information for the customers in the U.S.A.
This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna
Relocate the equipment with respect to the receiver
Move the equipment away from the receiver
Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Notice for the customers in Canada
This apparatus complies with the Class B limits for radio noise emissions set out in Radio Interference Regulations.

Owner's Record

The model and serial numbers are located on the bottom. Record the serial number in the space provided on the right hand. Refer to these numbers whenever you call upon your Sony dealer regarding this product.

Model No. CCD-F401
Serial No. _____

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Introduction

Thank you for purchasing a Sony Handycam ® camcorder. With your Handycam you can capture life's precious moments with superior picture and sound quality. Your Handycam is loaded with advanced features, but at the same time it is very easy to use. You will soon be producing home video that you can enjoy for years to come.

About This Manual

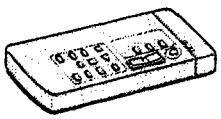
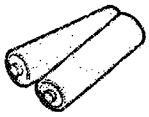
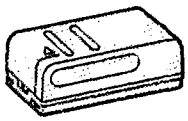
This manual will show you how to operate the unit. To get the most out of the features of Handycam, we recommend you read this manual thoroughly. But if you want to shoot immediately, please read the chapters, **Getting Started** and **Basic Camera Operation.** Once you are familiar with basic operations, you may want to proceed to the chapter, **Advanced Camera Operation.**

- When you are reading through this manual, please remember that buttons and settings on the camcorder are in capital letters:
  e.g. Set POWER to CAMERA.
- Use "Identifying the Parts" as an index to looking for a function and operation according to the indication printed on the camcorder itself.

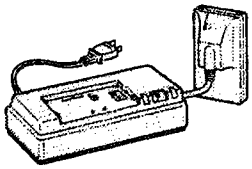
Checking Supplied Accessories

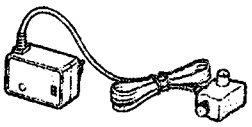
Please check that the following accessories are supplied with your camcorder.

- Wireless Remote Commander (1)
- Size AA (R6) battery for Remote Commander (2)
- Battery pack NP-66H (1)

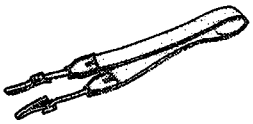




- AC power adaptor AC-V60/60A (1)
- Lithium battery CR2025 (1)
- RFU adaptor RFU-90UC (1)





- Shoulder strap (1)
- Lens cap (1) (attached to the camcorder)



Before You Start

Before you can start recording, you need to:

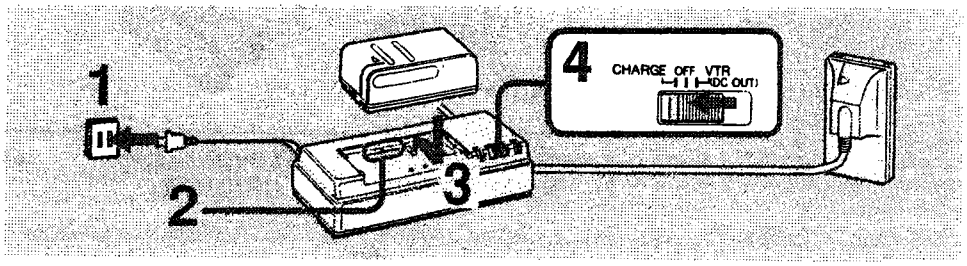
1 Charge and install the battery pack.
2 Install the lithium battery.
3 Set the date and time.
4 Insert a tape.
5 Adjust the viewfinder lens to your eyes.
6 Set the BEEP switch.

Let's go through these procedures step by step!

Charging and Installing the Battery Pack

Before you can use this camcorder, you need to charge and install the battery pack.

Charging the Battery Pack



1 Plug the AC power adaptor into a wall outlet.
2 Align the flat side of the battery pack with the line on the AC power adaptor.
3 Push down and slide the battery pack in the direction of the arrow.
4 Set the CHARGE/VTR switch to CHARGE.

Required charging time:

Type of battery pack	NP-66H (supplied)	NP-77H	NP-77	NP-55
Required charging time	100	140	120	60

(approx. minutes using AC-V60/60A)

When charging is finished, the charge indicator will go out.

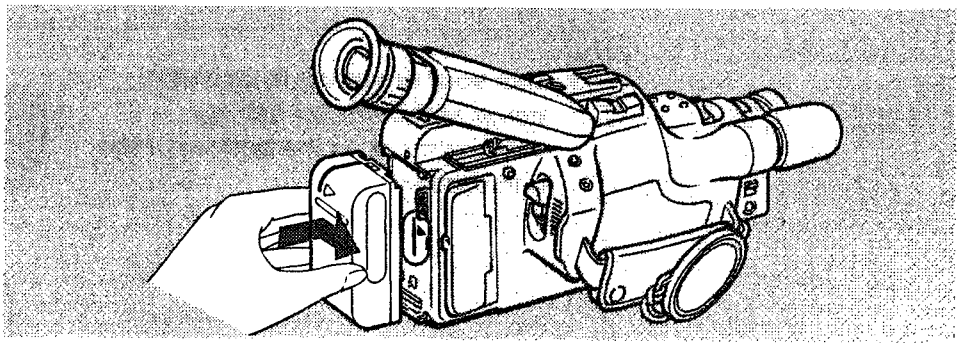
Important!

Use the battery completely before charging!

Before you recharge the battery, make sure the battery has been used (discharged) completely to avoid capacity down of the battery caused by excessive charging.

To use up the battery, remove the video cassette and simply slide POWER to CAMERA with the battery attached, and leave the camcorder until the ⏍ mark appears blinking and a red lamp blinks in the viewfinder.

Installing the Battery Pack



When you have finished charging the battery, install the battery pack as follows:

1 Align the flat side of the battery pack with the line on the camcorder.
2 Make sure that the arrow on the battery pack is close to the top of the camcorder.
3 Push down and slide the battery pack in the direction of the arrow.

Note

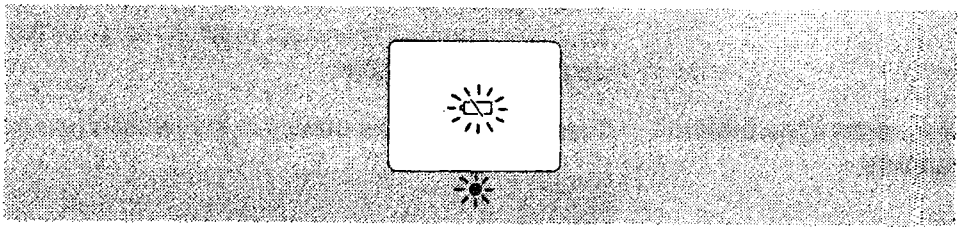
Make sure the battery is securely installed so that it does not fall. If the battery is not installed properly, the camcorder will not record accurately.

A fully charged battery pack lasts for:

Type of battery pack	NP-66H (supplied)	NP-77H	NP-77	NP-55
Battery life	85	110	90	50

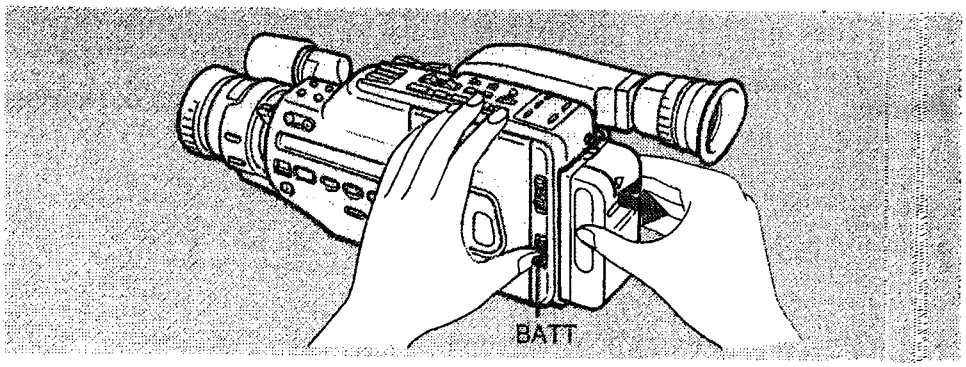
(approx. minutes, continuous recording when used indoors)

When the battery becomes weak, the indication and red lamp blink in the viewfinder. Wait until they blink rapidly, then replace the battery pack with a fully charged one.



To remove the battery pack

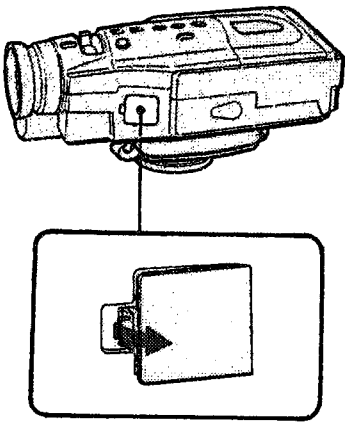
Slide BATT up, and at the same time, slide out the battery pack to the left.



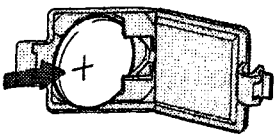
Installing the Lithium Battery

To keep a title and birth dates in the camcorder's memory as well as to activate the clock, lithium battery must be installed.

1 **Use your fingernail to open the cover of the lithium battery compartment on the bottom of the camcorder.**



2 **Install the supplied CR2025 lithium battery with the + side facing out.**



3 **Close the cover.**

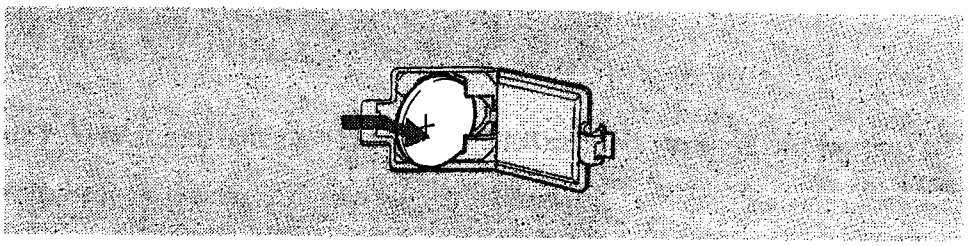
Lithium battery life

The battery will last for approximately 1 year in normal operation.
When the lithium battery becomes weak, the ⚠ indication will blink in the viewfinder screen for about 5 seconds when you set POWER to CAMERA. In this case, **replace the battery with a Sony CR2025 or Duracell DL-2025. Use of any other battery may present a risk of fire or explosion.**

When replacing the lithium battery, keep the battery pack or other power source attached. Otherwise, readjustments of the date, time, title and birth dates will be necessary.

To remove the lithium battery

Press the side of the battery in the direction as indicated for installation.

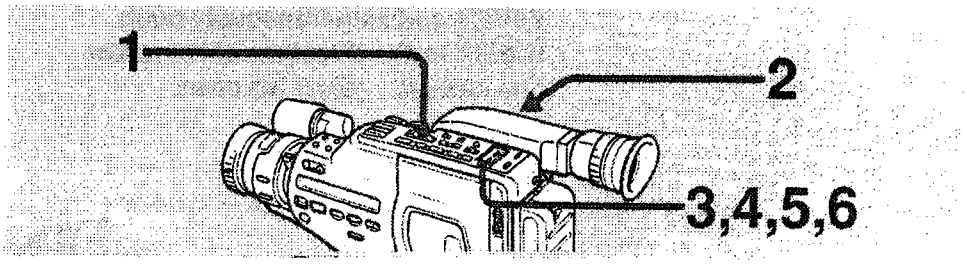


Warning

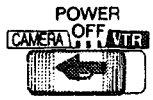
Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

Setting the Date and Time

Now, let's adjust the clock inside the camcorder to be able to superimpose date and time onto your video.
Make sure that power source and lithium battery are attached.

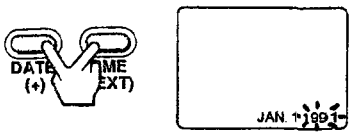


1 **Press the small green button on POWER and slide POWER to CAMERA.**



2 **Push the cover of the red button up until it snaps into STANDBY.**

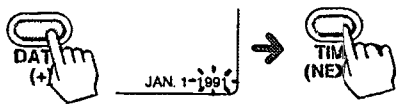
3 **Press DATE (+) and TIME (NEXT) simultaneously for more than one and a half seconds until the date indication appears in the viewfinder.**
DATE button now functions as + (to advance numbers) and TIME button functions as NEXT (to set).



4 **Adjust the flashing digits of the year, month, day, and hour using DATE (+), and press TIME (NEXT).**

Notes
- When you keep DATE (+) pressed, the digits advance faster.
- The year starts at 1991 and proceeds as follows:
  1991→1999→2000→2020

❶



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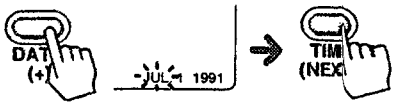

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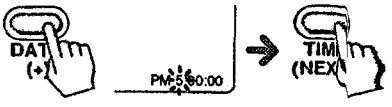
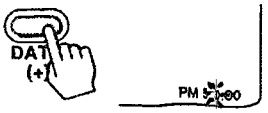


5 **Adjust the flashing digits of minute using DATE (+).**



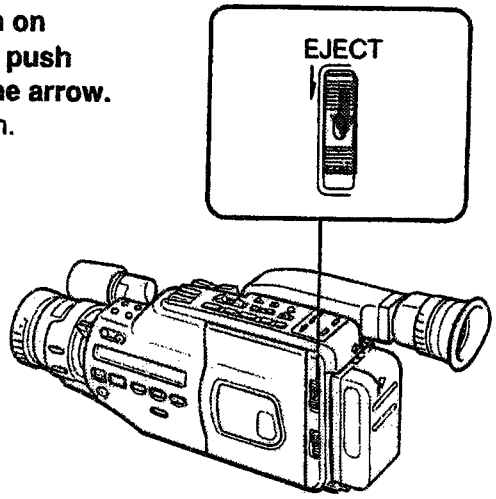
6 **Press TIME (NEXT) to set the second to "00".**
The clock starts operating.

To correct date and time setting Repeat steps 3 to 6.

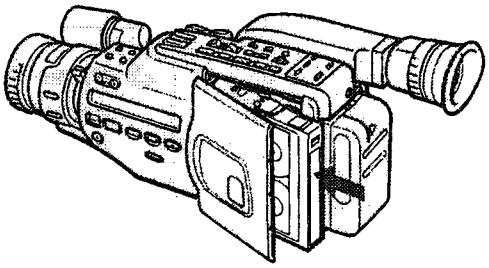
Inserting a Tape

Make sure that the battery pack or other power source is attached.

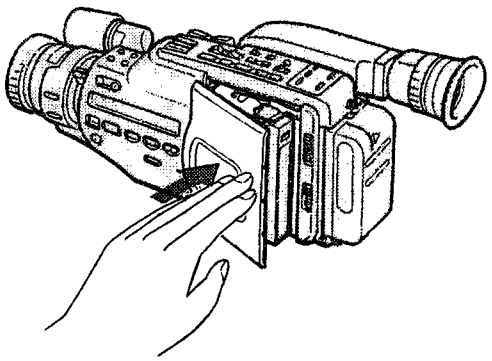
1 **Press the small blue button on EJECT and simultaneously push EJECT in the direction of the arrow.**
The cassette holder will open.



2 **Insert a tape with the window facing outside.**

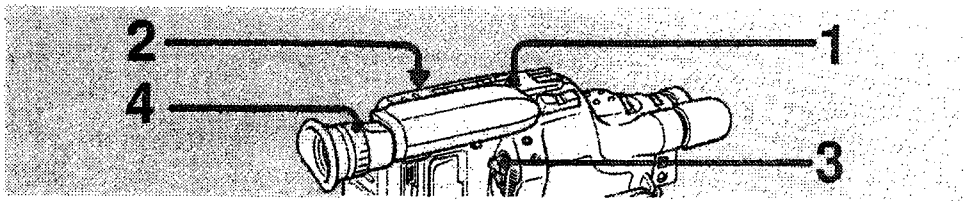


3 **Close the cassette holder by pressing the area marked "PUSH".**

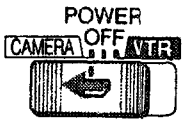


Adjusting the Viewfinder Lens

You may want to adjust the viewfinder lens to best fit your eyesight when you use this camcorder for the first time, or when you use it after someone else did. Make sure that a battery pack or other power source is attached to the camcorder.

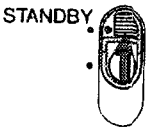


1 **Press the small green button on POWER and slide POWER to CAMERA.**

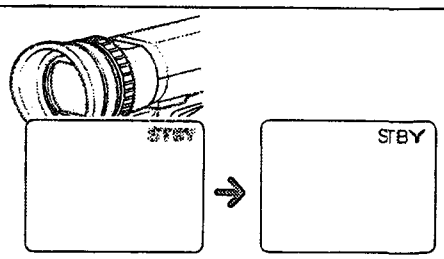


2 **Insert a tape.**
(See page 10.)

3 **Push the cover of the red button up until it snaps into STANDBY.**

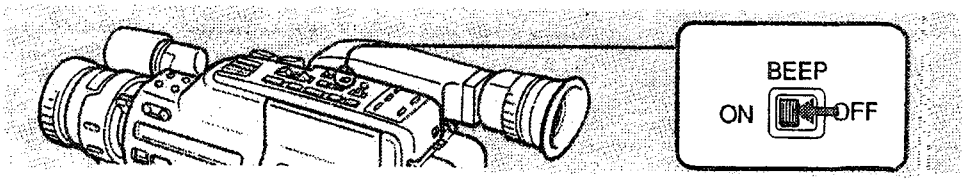


4 **Turn the ring around the viewfinder lens until the "STBY" indication displayed in the viewfinder screen comes into sharp focus.**



Setting the BEEP Switch

This beep sound is to help you cofirm when you start and stop recording.
When BEEP is set to ON, it will beep once when you start recording and beep twice when you stop recording.
It will also beep several times as a warning of any unusual conditions of the camcorder.
If you want to deactivate the beep, set BEEP to OFF.



Notes

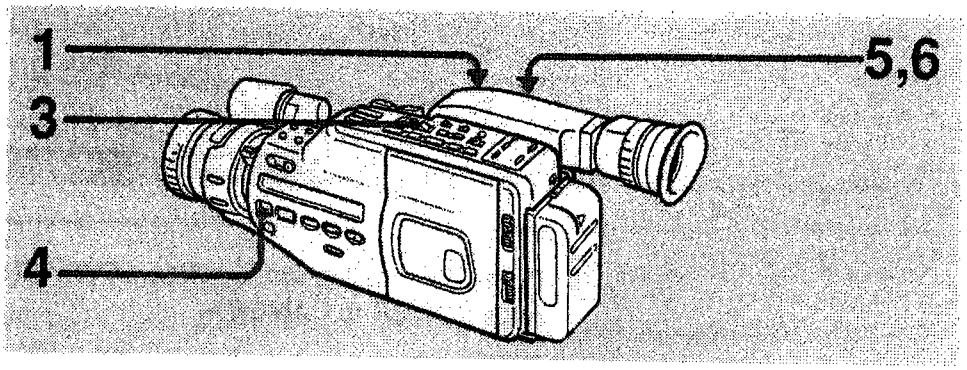
- Beep will not be recorded on the tape.
- For warning beep, see page 74.

Now it's ready for recording!

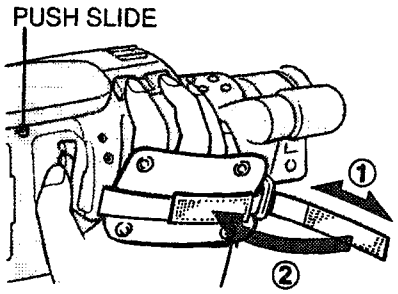
How to Record

Before you record one-time events, make a trial recording to make sure that the camcorder is working perfectly.

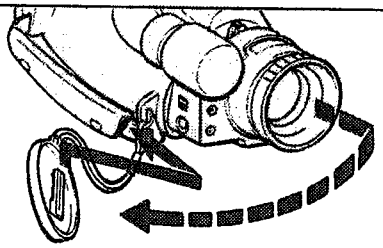
It is very easy to start recording scenes.



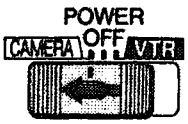
1 **Hold the camcorder by putting your hand through the grip belt so that your thumb can easily press the red START/STOP button.**
If your nose touches the camcorder, press PUSH SLIDE and adjust the position and angle of the viewfinder.



2 **Remove the lens cap and attach it to the grip belt.**

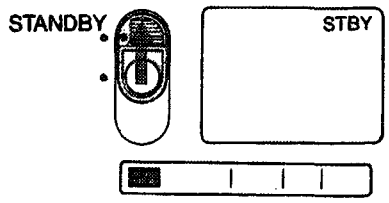


3 **Press the small green button on POWER and slide POWER to CAMERA.**
This will put camcorder in camera recording mode.

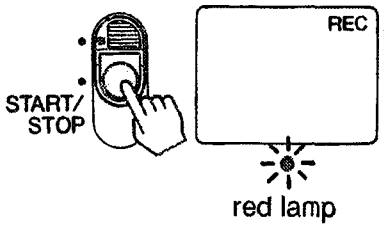


4 **Set AUTO LOCK to the green position.**
This will make every adjustment automatic.

5 Push the cover of the red button up until it snaps into STANDBY.
Now, you can see through viewfinder. "AUTO LOCK" appears in the display window.



6 Press START/STOP (red button) once.
The camera is recording when the word "REC" appears on the viewfinder screen and the red lamps light in the viewfinder and on the camcorder. You can also confirm the start of recording with beep sound when you have the BEEP switch turned on.



In the viewfinder you can see a black and white picture of what you are recording and information that indicates what the camcorder is now doing.

Automatic recording

With AUTO LOCK set to the green line, all the camera functions are on automatic (i.e. autofocus, auto iris, auto white balance) and the shutter speed is set at normal (1/60 second.)

To stop recording momentarily

Press START/STOP again. "STBY" appears in the viewfinder. It beeps twice when you have BEEP turned on.

When you have finished recording

1 Push the cover of the red button down to cover the START/STOP button.
2 Slide POWER to the center OFF position.

Ejecting the tape

Make sure that you have attached the battery pack or other power source to the camcorder.
1 Press the small blue button on EJECT, and at the same time push EJECT in the direction of the arrow.
2 Take out the tape.
3 Press the PUSH mark on the cassette holder to close it.

About the sports finder

This camcorder is equipped with the sports finder. As the focul length of this finder is long, you can monitor the picture while being away from the eyecup.

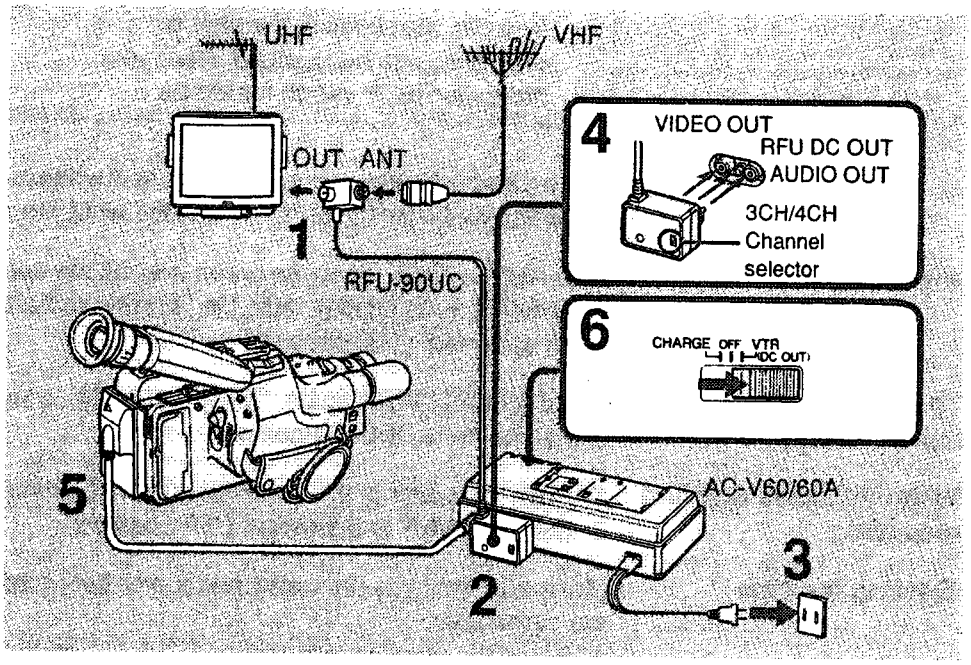
Caution!
Please remember that you can only use 8-mm format video tapes with this camcorder, and that is not possible to use PCM recording/palyback available on some 8 mm recorders. The PCM sound recorded or after-recorded with other recorder cannot be played back with this camcorder. You will be able to record tapes in SP (standard play) mode only and play back tapes in both SP and LP (long play) modes.

How to Play Back a Tape

You can use this camcorder as a VCR by connecting it directly to your TV for playback. After you connect this camcorder to your TV, use the Remote Commander for convenient control of the camcorder.

If Your TV Has Only an Antenna Input

There are several ways to connect the camcorder to your TV. Please check whether your TV has video/audio inputs. If your TV has only an antenna input, use the supplied RFU adaptor and AC power adaptor. The playback sound will be monaural. Make sure that the TV is turned off to prevent speaker damage before hooking up your camcorder.
If your TV has video/audio inputs, see page 50.



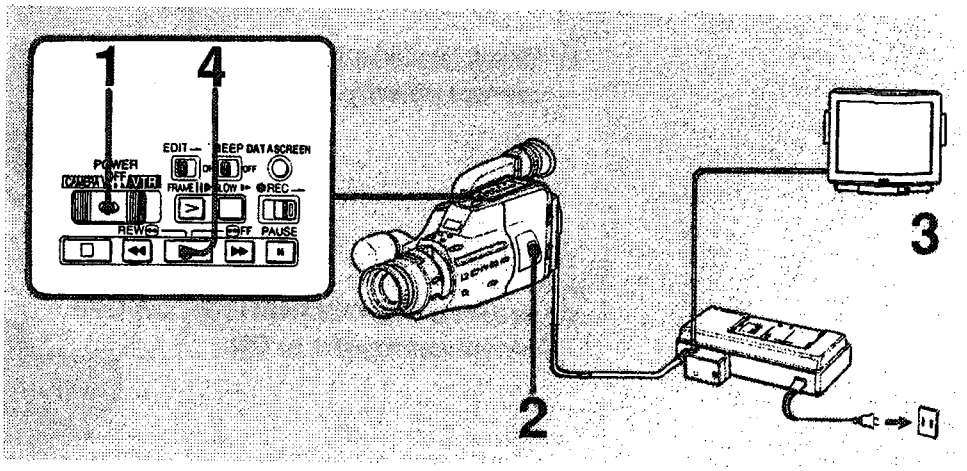
To add your camcorder connection to your TV which is already connected with regular TV (VHF) antenna, you need to:

1 Unplug the antenna cable from your TV first.
Plug in the tail end of the RFU adaptor marked OUT to the antenna input of your TV. Re-wire the antenna cable you unplugged to the RFU adaptor jack marked ANT. This way, you can switch between TV broadcasting and your home video playback without re-wiring.
2 Connect the RFU adaptor to the AC power adaptor.
3 Connect the AC power adaptor to a wall outlet.
4 Set the channel selector on the RFU adaptor (and your TV channel) to 3 CH or 4 CH of the VHF channel, whichever is not active (vacant) in your area.
5 Attach the connecting plate of the AC power adaptor to the camcorder.
6 Make sure the CHARGE/VTR selector on the AC power adaptor is set to VTR position.

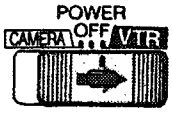
You may want to keep the AC power adaptor and RFU adaptor connected to your TV once you have established the connection. This way you can easily connect your camcorder to your TV just by attaching the connecting plate of the AC power adaptor to the camcorder. (Steps 5 and 6)

When you want to switch to regular TV program, set the CHARGE/VTR selector to OFF or turn off the power of the camcorder.

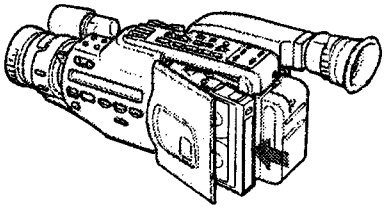
How to Play Back a Tape



1 **Press the small green button on POWER and slide POWER to VTR.**



2 **Insert a tape, if it is not in the camcorder.**



3 **Turn on the TV and select the channel that you adjusted the RFU adaptor (3 CH or 4 CH).**
If you are connecting with video/audio inputs, set TV's TV/VIDEO selector to VIDEO.

4 **Press ▷.**

To stop playback, press □.
To rewind the tape, press ◀◀.
To advance the tape rapidly, press ▶▶.

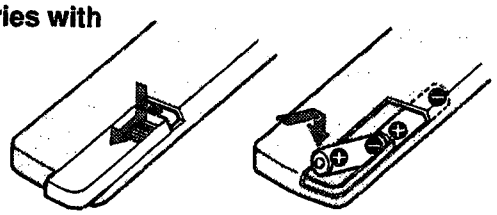
When you have finished playback

1 Slide POWER to the center OFF position.
2 Set CHARGE/VTR on the AC power adaptor to OFF.

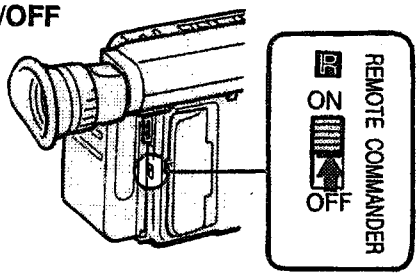
Using the Remote Commander

By using the Remote Commander, you can record yourself with your friends or family, or conveniently control the playback of your tape from a distance.

1 **Insert two size AA (R6) batteries with correct polarity.**



2 **Set REMOTE COMMANDER ON/OFF on the camcorder to ON.**

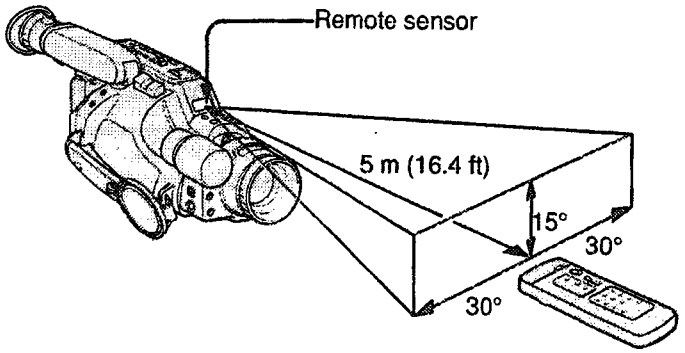


3 **Set POWER on the camcorder as follows:**

–When recording, 1) press the small green button on POWER and slide POWER to CAMERA, 2) push the cover of the red button up until it snaps into STANDBY.

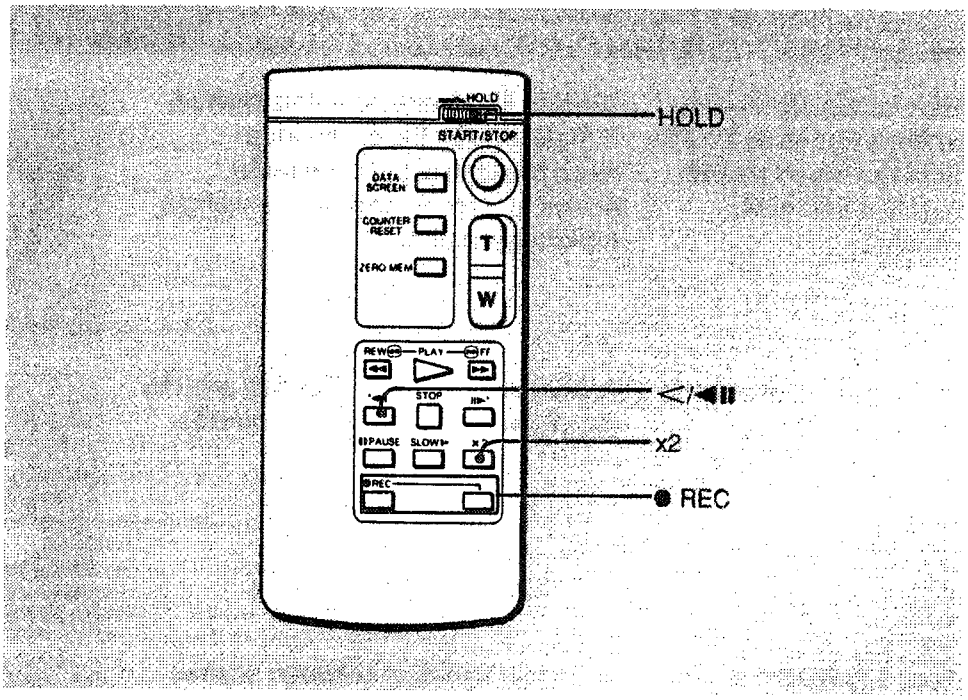
–When playing back, slide POWER to VTR.

4 **Point the Commander to the remote sensor of the camcorder and press the appropriate button on the Commadner.**



(Maximum distance and angle for remote control)

Getting familiar with some buttons



HOLD switch
When you slide the switch in the direction of the arrow, all the buttons will become inoperable to prevent any misoperation when you accidentally press the buttons.

</◀II (reverse direction/reverse frame) and ×2 (double speed playback) buttons
You can use the functions of these buttons only with the Commander.

●REC buttons
When you record in the VCR mode, press these two buttons simultaneously.

Battery life

In normal operation, batteries will last up to six months. If the camcorder does not operate properly, the batteries might be exhausted. Replace both batteries with new ones.

To avoid damage from possible battery leakage

Remove the batteries when you will not use the Commander for a long time.

When you connect the receiver of a remote control kit

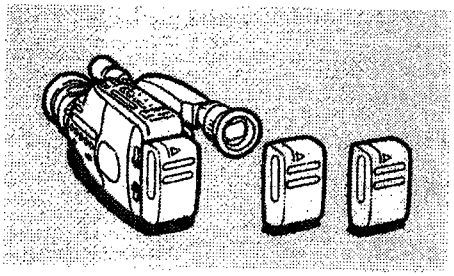
When you connect the receiver of a remote control kit (not supplied) to the REMOTE control connector, be sure to set REMOTE COMMANDER ON/OFF on the camcorder to OFF.

How to Get the Most out of Your Battery Pack

How to Prepare the Rechargeable Battery Pack

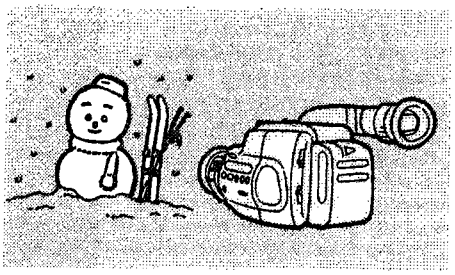
Have sufficient battery pack power to do 2 or 3 times as much recording than you have planned.

"Battery life" indicated in this manual is measured by the continuous recording time of the camcorder, placed at a room temperature using a full-charged battery.



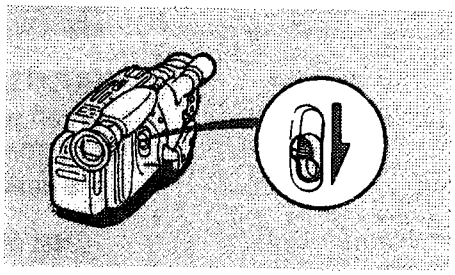
Battery life is shorter in a cold climate.

Battery efficiency is decreased and the battery will be used up more quickly.



Turn STANDBY of the camcorder off when not recording to save battery power.

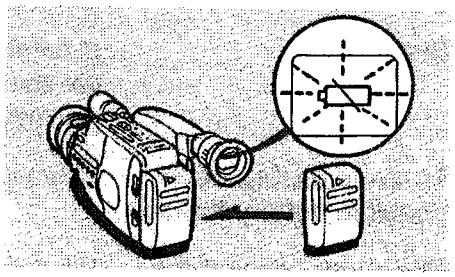
A smooth transition between scenes can be made even if recording is stopped and started again.
While positioning the subject or selecting an angle, or looking through the viewfinder lens, the lens moves automatically and the battery is used.
The battery is also used when a tape is inserted or removed.



When the Rechargeable Battery Pack Should Be Replaced

When the ⌂ mark and red lamp in the viewfinder change from slow blinking to rapid blinking while you are recording.

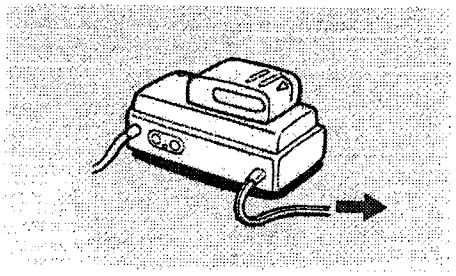
Turn off the power switch of the camcorder and replace the battery pack. Leave the tape in the camcorder in order to obtain a smooth transition between scenes after the battery pack is replaced.



Notes on Charging

Before using the battery pack, charge it sufficiently.
Make sure you use up the battery before recharging.

A brand new battery pack is not charged.



- If recording is completed before the ⌂ mark appears in the viewfinder, it is recommended that you remove the tape, set POWER to CAMERA, push the cover of the red button up until it snaps into STANDBY, and leave the camcorder until the ⌂ mark blinks rapidly.
- Repeated charging without using up the battery may cause lowering of battery capacity. However, the original battery capacity can be recovered if you fully discharge (use up) and charge the battery again.

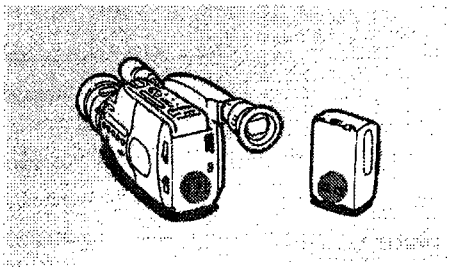
Recharge the battery pack after long storage.

If the battery pack is charged fully but not used for a long time (about 1 year), it becomes discharged.
Charge it again but in this case the battery life will be shorter than normal. After several charging and discharging cycles, the battery life will recover its original capacity.

Keep the Terminals Clean

If the terminals (metal parts on the back) are not clean, the battery duration will be shortened.

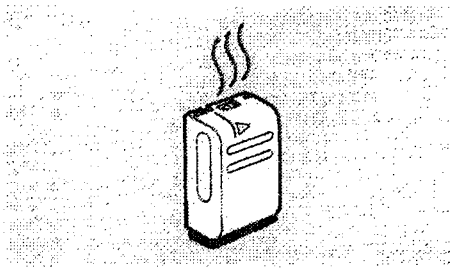
When the terminals are not clean or when the battery pack has not been used for a long time, install and remove the battery pack from time to time. This will improve the contact condition. Also, wipe the + and – terminals with a soft cloth or paper.



Notes on the Rechargeable Battery Pack

Why the battery pack heats up?

During charging or recording, the battery pack heats up. This means energy has been generated and chemical change has occurred inside the battery pack, and this is not dangerous.

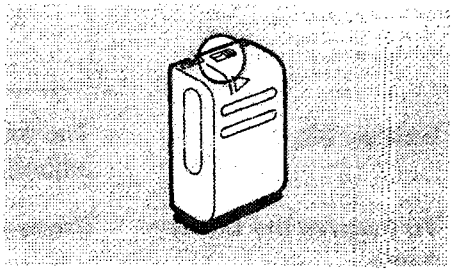


How to care for the battery pack

- Remove the battery pack from the camcorder after using it, and keep it in a cool place. When the battery pack is in the camcorder, a small amount of current flows to the camcorder even if POWER is turned off. It causes overdischarging and shortens battery life.
- The battery pack is always discharging even when it is not in use after charging.
  Thus, it is recommended you charge the battery right before using.

How to use the switch on the battery pack

This switch is provided so that you can remember the charging condition. Set the switch to the "no mark" position when charging is completed. Set the switch to the "red mark" position when the battery is used up.



How many times can the battery pack be recharged?

It can be fully charged and discharged about 500 times under normal temperatures.
If the ⏍ mark blinks rapidly just after turning on the camcorder with a fully charged battery pack, the battery pack should be replaced with a new fully charged one.

Recommended temperatures during charging

Lower temperatures require a longer charging time. Charging under temperatures ranging from 10°C to 30°C (5°F to 85°F) is recommended

Connecting Alternative Power Sources

You can choose any of the following power sources for your camcorder: battery pack (see page 6), alkaline batteries, house current, and 12/24 V car battery. The appropriate power source for you to choose depends on the place where you want to use your camcorder.

Place	Power source	Accessory to be used
Outdoors	Battery pack	Battery pack NP-66H (supplied), NP-77H, NP-77 or NP-55
	Alkaline batteries	Battery case EBP-55
Indoors	House current	AC power adaptor AC-V60/60A (supplied), AC-V30 or AC-V55
In the car	12 V or 24 V car battery	DC pack DCP-77 or DCP-55

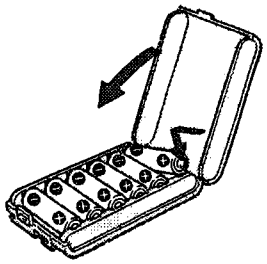
Note on power sources

Disconnecting the power source or removing the battery pack during recording or playback may damage the inserted tape. In this case, supply the power again immediately.

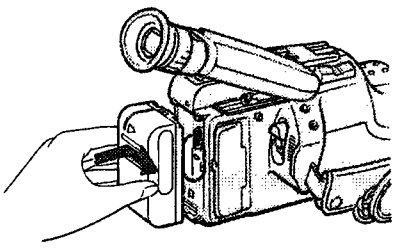
Using Alkaline Batteries

The EBP-55 battery case (not supplied) is required .

1 Insert the six size AA (R6) alkaline batteries into the battery case.



2 Attach the case in the same way as the battery pack. (See page 7.)



Battery life

The battery life is approx. 40 minutes (continuous recording when used indoors).

To remove the battery case

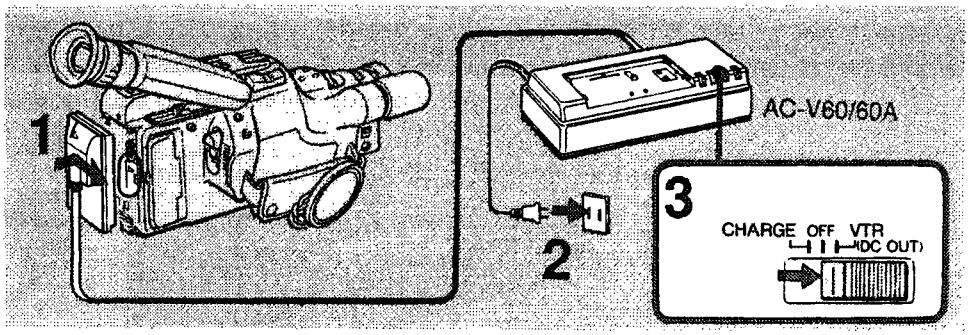
Proceed in the same way as the battery pack. See page 7.

Notes on battery life

- Batteries will not last as long in cold places.
- No indication appears in the viewfinder to warn of a weak battery.

Using House Current

The supplied AC-V60/60A AC power adaptor is required.



1 Align the flat side of the connecting plate with the line on the camcorder, and push down and slide it in the direction of the arrow.

2 Connect the AC power adaptor to a wall outlet.

3 Set the CHARGE/VTR selector of the AC power adaptor to VTR.

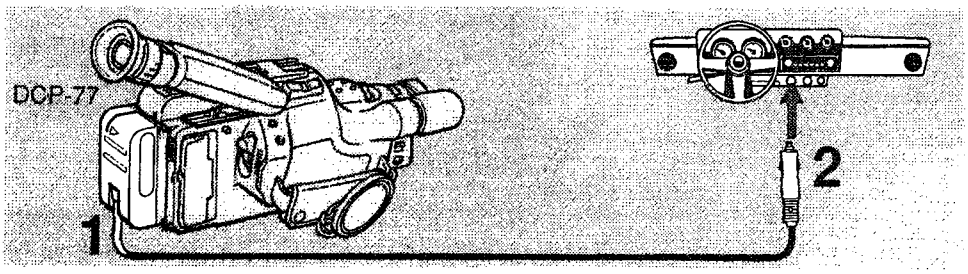
See the instruction manual of the AC power adaptor for details.

To remove the connecting plate

Remove it the same way as you do with the battery pack. See page 7.

Using Car Battery

The DCP-77 DC pack (not supplied) is required.



1 Align the flat side of the DC pack with the line on the camcorder, and push down and slide it in the direction of the arrow.

2 Connect the cord of the DC pack to the cigarette lighter socket of a car (12 V or 24 V).

To remove the DC pack

Proceed in the same way as the battery pack. See page 7.

Options

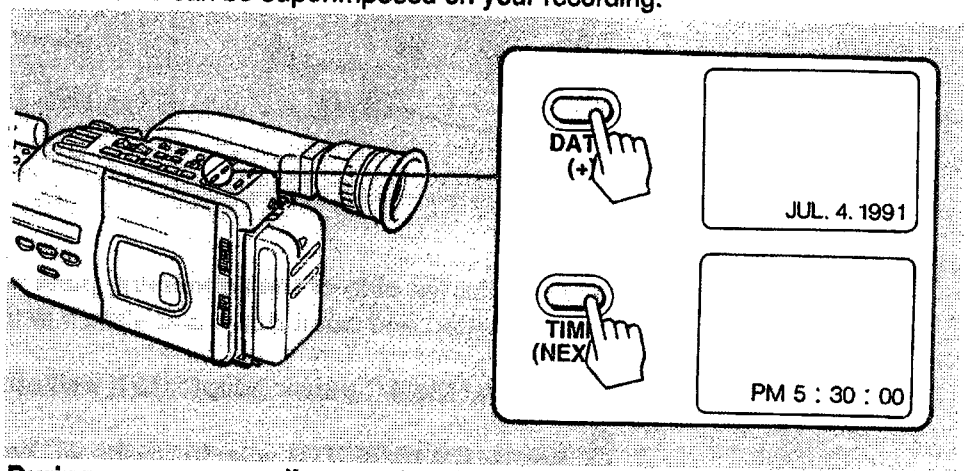
- AC-V55 AC power adaptor:
  You can charge two battery packs continuously using this adaptor and the house current. By connecting this adaptor with the DCC-16AW car battery cord, you can use your camcorder with the car battery.
- BC-55, BC-77 portable battery charger:
  You can charge a battery pack on 100-240 V AC.
- DC-V30 car battery charger:
  You can charge a battery pack through the cigarette lighter socket.

Camera Recording

In the previous chapter "Basic Camera Operation", you learned the basic recording operations. This section shows you how to record the date or time, record in a strong wind, re-record a picture, prevent accidental erasure, and more.

Recording the Date or Time

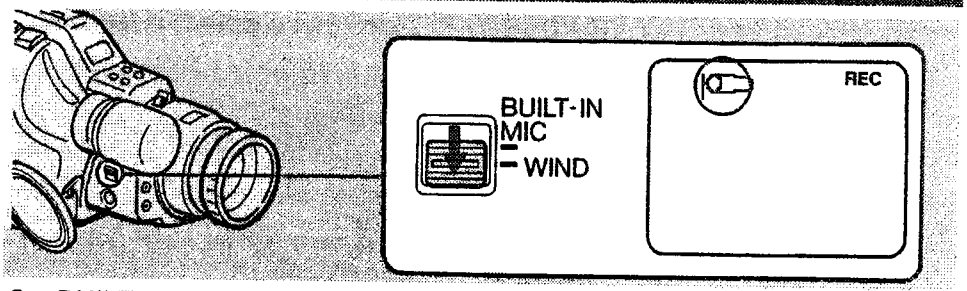
Date or time can be superimposed on your recording.



During camera recording or when in standby mode, press DATE for date indication or TIME for time indication.
The date or time displayed in the viewfinder is recorded with the picture.

To stop recording date or time
Press DATE or TIME again.
The picture recording continues.

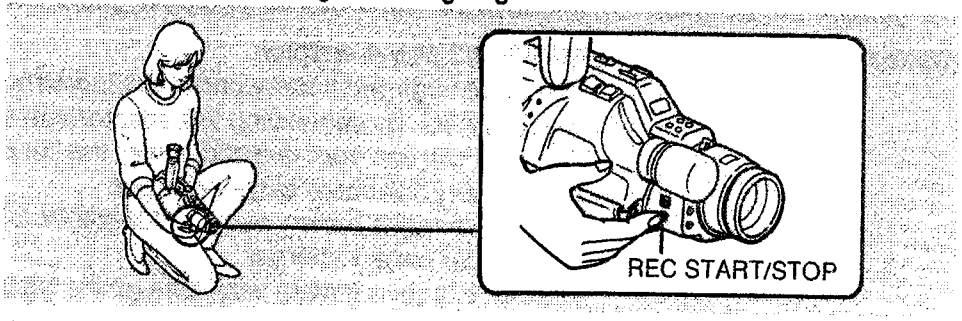
Recording in a Strong Wind



Set BUILT-IN MIC to WIND. The wind noise will be reduced. Wind mark will appear in the viewfinder.
After recording, return it to the green position.

For Low-position Recording

You can also record from low position using separate REC START/STOP button to get an interesting recording angle.

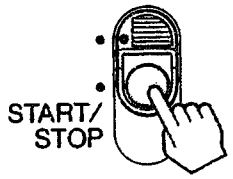


Adjust the viewfinder (It can be turned 90 degrees up.)
Press REC START/STOP in front of the camcorder.
To stop recording, press it again.

Checking the Last Portion of a Scene You Just Recorded (EDITSEARCH)

You can check the last portion of a scene you just recorded without changing the setting of the POWER switch using EDITSEARCH.

1 Set the camcorder in standby mode by pressing the START/STOP button.



2 Press the – ⏪ side of EDITSEARCH momentarily.

The last few seconds of the recorded portion will be played back in the viewfinder. After a few seconds of playback, the camcorder goes back to standby mode, ready for next recording.

Hints for Recording

If the tape reaches near the end during recording

The 📼 indication and the red lamp in the viewfinder and the camera recording/battery lamp on the camcorder blink slowly. When the tape reaches its end, blinking becomes rapid and beeps sound for about five seconds (if BEEP is set to ON.)

Notes on recording

- To record from the beginning of the tape, run the beginning of the tape for about 15 seconds before recording. This will avoid missing the starting point when the tape is played back.
- When moving from indoors to outdoors, or vice versa, push the cover of the red button up until it snaps into STANDBY and point the camcorder at a white object for about 10 seconds so that the white balance is properly adjusted.

Note on standby mode

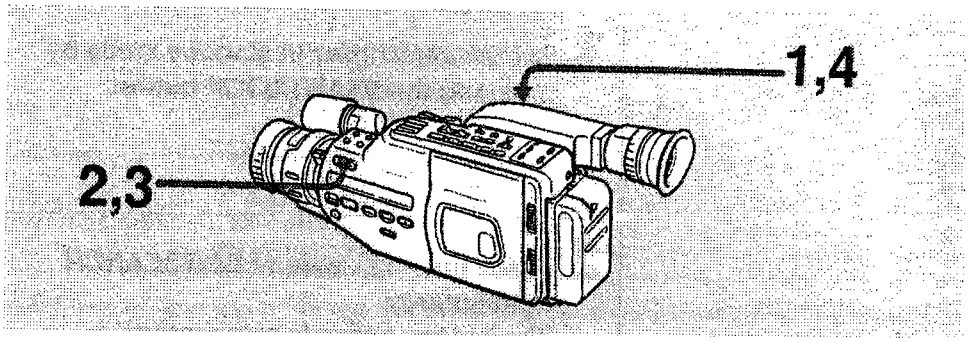
If you leave the camcorder in standby mode for 5 minutes or more, the camcorder will be automatically turned off. To resume standby mode, push the cover of the red button down once and push it up again. To start recording, press START/STOP directly.

Note on light sources

If you are shooting a subject in bright conditions just after shooting in a dark place, the picture may not appear in the viewfinder. In this case, point the camcorder to the other direction.

Re-recording on a Previously Recorded Portion (EDITSEARCH)

You can reshoot a scene over the last recorded portion using EDITSEARCH. The previously recorded portion will be erased.



1 **Push the cover of the red button up until it snaps into STANDBY.**

2 **Look in the viewfinder and find the point from where you want to begin recording by:**
Keep pressing the + side of EDITSEARCH continuously to advance the picture at a normal playback speed, or the – side to reverse the picture.

3 **At the desired point, release EDITSEARCH.**

4 **Press START/STOP.**
Recording begins from the point you released EDITSEARCH.
A smooth transition between scenes can be made after the pre-recorded portion even if the cover of the red button is pushed down and pushed up, or even if the power is turned off and on again, provided that the tape is not removed.

To pause recording

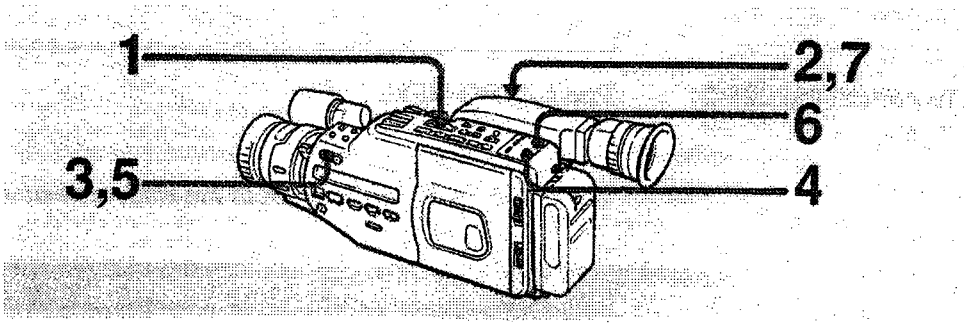
Press START/STOP again.

To stop recording

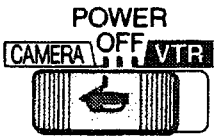
Push the cover of the red button down to cover START/STOP.

Inserting Scene in the Middle of a Recorded Tape

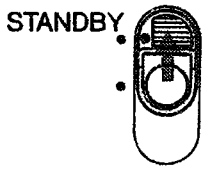
You can insert a scene in the middle of a recorded tape by setting the starting point and ending point. A previously recorded portion will be erased.



1 **Press the small green button and slide POWER to CAMERA.**

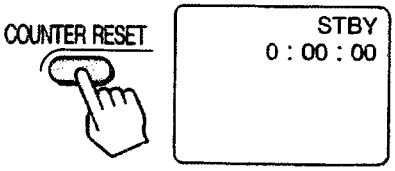


2 **Push the cover of the red button up until it snaps into STANDBY.**

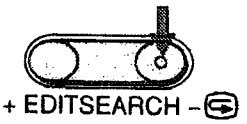


3 **While looking in the viewfinder, keep pressing the + or – side of EDITSEARCH and release the button where you want to end the insertion.**
The camcorder is set to standby mode.

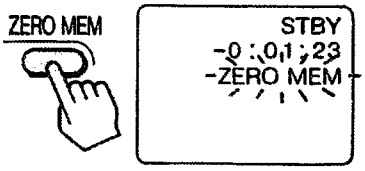
4 **Press COUNTER RESET.**
The counter is reset to zero.



5 **While looking in the viewfinder, keep pressing the – side of EDITSEARCH and release the button at the point where you want to start the insertion.**



6 **Press ZERO MEM.**
The insert ending point is stored in memory.



(To be continued)

7 **Press START/STOP.**
Insert recording begins. The insert recording stops automatically at the counter zero point.

To cancel the ZERO MEM

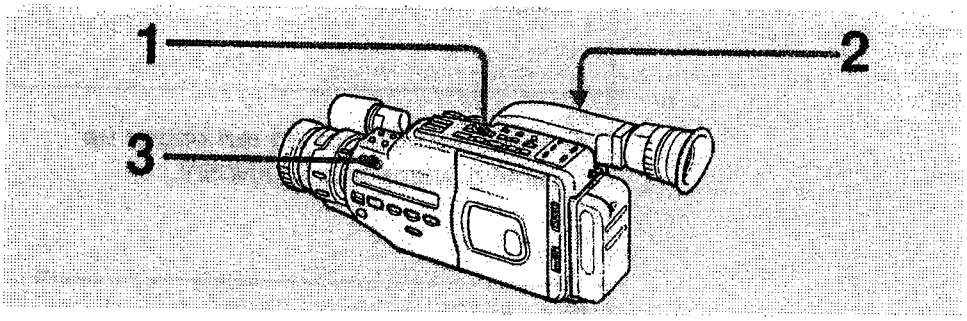
Press ZERO MEM.

Note

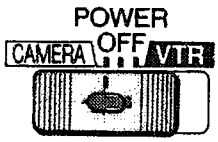
The picture may be distorted at the ending point when played back.

Checking Recording in the Viewfinder (EDITSEARCH)

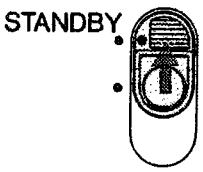
You can check the recorded picture in the viewfinder using EDITSEARCH. Sound cannot be monitored.



1 **Press the small green button, and slide POWER to CAMERA.**



2 **Push the cover of the red button up until it snaps into STANDBY.**



3 **Keep pressing the + or – side of EDITSEARCH to view the playback picture:**
+ side for the playback picture
– side for the playback picture in reverse.

To stop playback

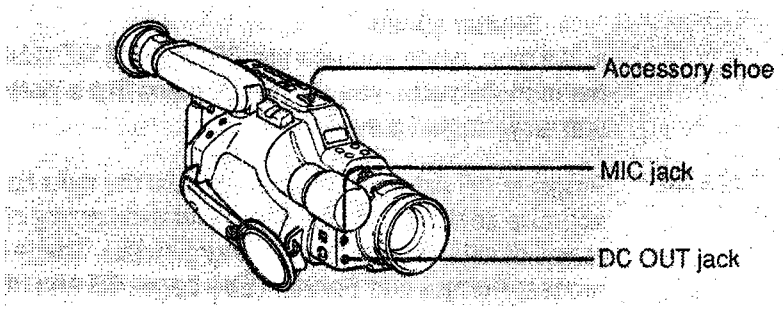
Release EDITSEARCH.

To monitor the sound while viewing the playback picture in the viewfinder

1 Connect an earphone to the ◉ (earphone) jack.
2 Press the small green button and slide POWER to VTR.
3 Press ◀◀ to rewind the tape and press □ where you want to stop.
4 Press ▷ to start playback.

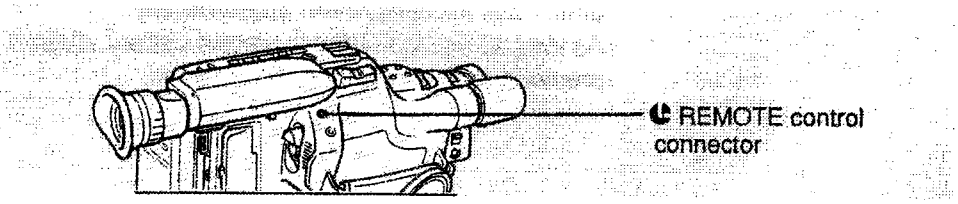
Recording with an External Microphone

You can connect an external microphone (stereo or monaural, not supplied) to the MIC jack. This jack also accepts a "plug-in-power" microphone. If the microphone has two plugs, connect the DC IN plug to the DC OUT jack. Attach the microphone to the accessory shoe of the camcorder.



Connecting a Wired Remote Control Unit

When you connect a wired remote control unit or editing controller (not supplied) to the ⏍ REMOTE control connector, you can operate your camcorder from a distance.

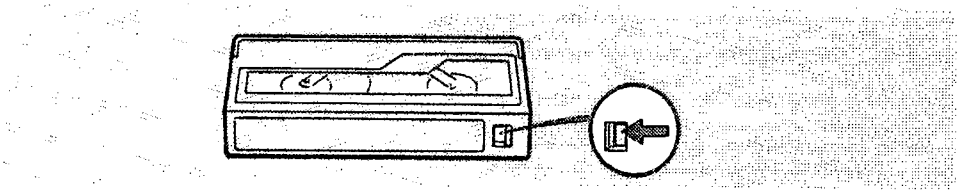


About ⏍ (LANC)

⏍ stands for Local Application Control Bus System. The ⏍ connector is used for controlling the tape transport of video equipment and peripherals connected to it. This connector has the same function as the connectors indicated as CONTROL L or REMOTE.

Preventing Accidental Erasure

Slide the tab on the cassette to expose the red mark. This will prevent accidental recording.
To re-record on this tape, slide the tab back out covering the red mark.
If you try to record with the red mark exposed, the ⌧ and ⏏ indications blink in the viewfinder and you will hear beep sound about five seconds.



Note on handling tapes

Never insert anything in the small holes on the rear of the cassette. These holes are used to sense the type and thickness of tape, or if the red mark is exposed or covered, etc. Store tapes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.

Making Manual Adjustments

The camcorder's automatic functions offer you worry-free operation under most shooting conditions. But in some circumstances, manual adjustment is better for effective recording. You can manually adjust the following items with this camcorder:

- Focus
- White balance
- Back light compensation
- Shutter speed

In addition, when you use the PROGRAM AE (Auto Exposure) function under the manual mode, you can get a scene like a portrait or clear picture in the still and slow motion playback.

What is PROGRAM AE (Auto Exposure)?

Program AE automatically selects just the right combination of shutter and aperture settings and gives you creative control of depth of field (distance range of object that will be in sharp focus). There are two preprogrammed modes; Portrait and Sports. (See pages 35 and 36.)

Function of the AUTO LOCK switch

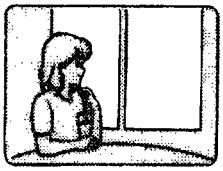
When you set AUTO LOCK to the green position, white balance, back light and/or shutter speed is returned to the normal setting regardless of the control setting. And focus is retained to autofocusing. Turning on the AUTO LOCK switch disables these control buttons. Turning off (at the lower white position) the AUTO LOCK switch does not automatically result in setting all of these items to manual. This merely enables the control buttons to be set manually. Some shooting situations may call for using some items manually, while others call for using them automatically.
As long as you do not remove the battery, even if you set POWER to OFF, the previous manual settings are retained.

Focusing Manually

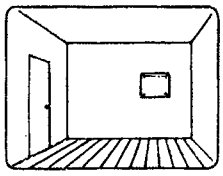
In the following cases you would obtain better results by adjusting the focus manually.

Insufficient light

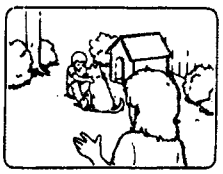
Too much brightness behind the subject



Subjects with little contrast-wall, sky, etc.

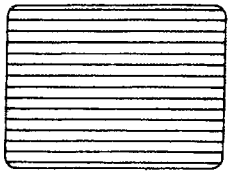


One subject is close; the other is in the center, but at a distance.

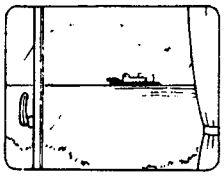


Subjects beyond nets, etc. or another subject passes in front of the camcorder

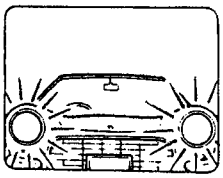
Horizontal stripes



Subject through frosted glass



Bright subject or subject reflecting light



High contrast behind the subject (The background may be focused.)

When you use conversion lenses or effect filters
When shooting in close-up (Macro)
When shooting a stationary subject using a tripod
To save battery wear

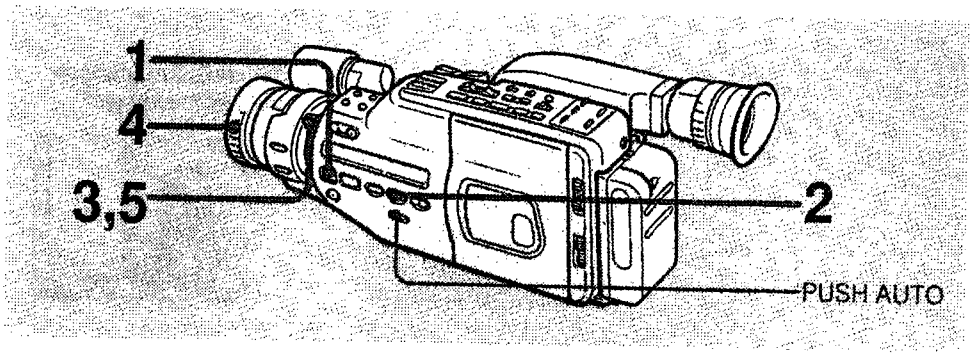
Autofocusing does not function momentarily when:

- The shutter speed is changed, or the back light adjustment is changed to manual mode.
- Lighting conditions change quickly.
- Zooming is done from wide-range to telephoto.

This camcorder keeps in focus by referring to the picture contrast, which is weak in the above situations.

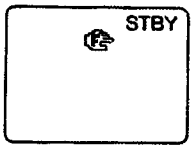
How to focus manually

When adjusting focus manually, best way is to first adjust at telephoto position before recording, then set the desired zoom angle.
Let's go through step by step.

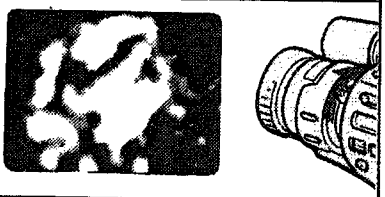


1 **Set AUTO LOCK to the lower position.**

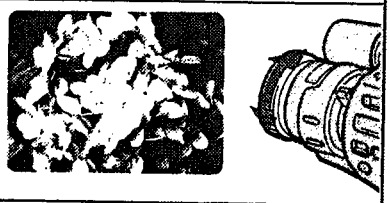
2 **Press FOCUS.**
The MF indication appears in the viewfinder.



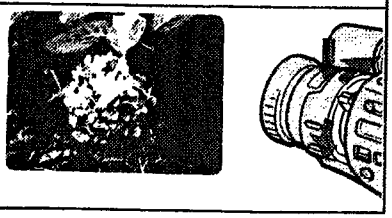
3 **Turn the manual zoom lever fully to the telephoto position.**



4 **Turn the focus ring to achieve sharp focus.**



5 **Set the desired shot length using the manual zoom lever, while pressing the gray button for wide-angle.**



Shooting with autofocusing momentarily

While shooting with manual focusing, press PUSH AUTO.
The autofocusing functions **while you are pressing the button.** When you release the button, manual focusing will be resumed. Use this button when you change the focus from one subject to another. The focusing performs naturally.
The previous settings except for focusing are retained.

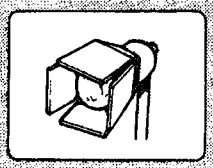
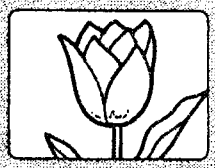
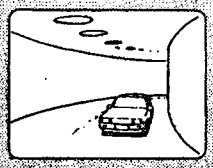
Some helpful hints

- When shooting in relatively dark places such as indoors, the depth of field in proper focus is very shallow. For best results, shoot at wide angles after focusing in telephoto.
- When shooting a scene with lots of movement in bright light, set the zoom lever to the wide-angle position and the focus ring to 2 to 3 m (7 to 10 ft).

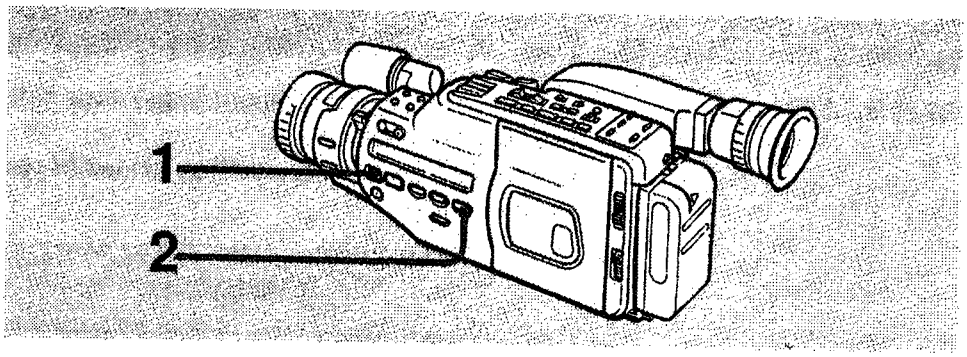
Adjusting the White Balance

What is white balance?

White balance adjustment means to get most natural color temperature under certain lighting condition.
In the following cases, you would obtain better results by adjusting the white balance manually.

Conditions		Inidcation in the viewfinder
	Lighting conditions change quickly	(indoor)
	Too bright, such as in photograph studios	
	Monochromatic subject or background	HOLD
	Under a sodium lamp	
	Under a mercury lamp	
	Under a color matching fluorescent lamp	(outdoor)
	Recording outdoors: a night view, neon signs or fireworks	
	Recording outdoors: scenes after sunset or before sunrise	

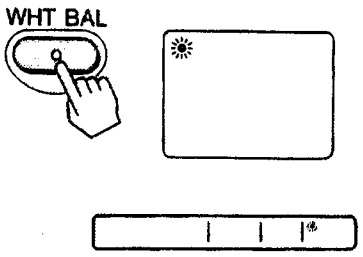
How to adjust the white balance



1 **Set AUTO LOCK to the lower position.**

2 **Select the desired white balance mode by pressing WHT BAL.**
Each time you press the button, the indication in the viewfinder and the display window changes as follows:

No inidcation → HOLD → ☀ → ☀



Note on manual adjustments

When moving from indoors to outdoors, or vice versa, set AUTO LOCK to the green position and adjust the white balance in auto mode, then reset the white balance manually.

Keeping the White Balance Setting (HOLD Mode)

What is the HOLD mode?

In the HOLD mode, the camcorder automatically adjusts the white balance according to the color temperature of the subject's light source and keeps that setting during recording. When recording some subjects with different color temperatures (when lighting condition changes often), use the HOLD mode. Then, you can achieve a recording with natural colors without being affected by the surroundings.

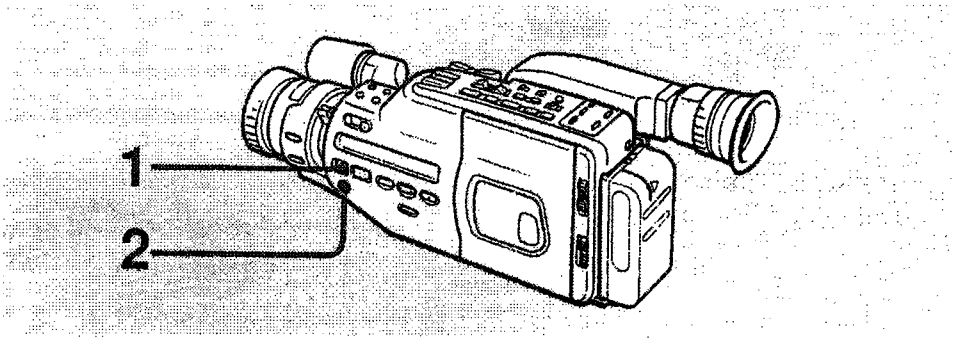
To set into the HOLD mode

1 Set AUTO LOCK to the lower position and press WHT BAL to set to Auto (no indication).
2 Point at and record a white, flat object such as a white wall, or paper.
If you cannot find a white object, you may want to attach the lens cap and direct the camcorder to light sources.
3 Press WHT BAL.
The HOLD mark appears in the viewfinder.

When you change the battery pack or setting of the white balance, or the light source is changed, you need to set to the HOLD mode again. In this case, follow the procedures above again.

Compensating Backlighting

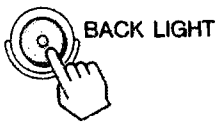
In this camcorder, the exposure is automatically controlled. However, when shooting a subject that is backlit, that is, if the light source is coming in from the back of the subject, use the BACK LIGHT button to get natural exposure.



1 **Set AUTO LOCK to the lower position.**

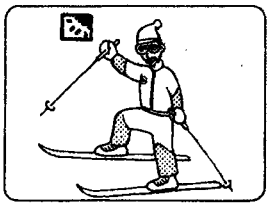
2 **Press BACK LIGHT.**

The ⧉ indication appears. If it does not appear, press the button again.



Subject is too dark because of backlight.

With backlight compensation

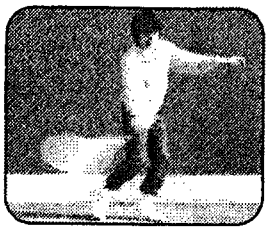


After shooting

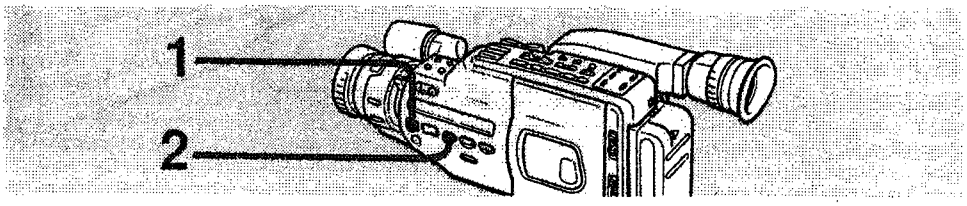
Be sure to release this adjustment condition by pressing BACK LIGHT again. (The ⧉ indication goes out.)
Otherwise, picture will be too bright under normal lighting condition.

Using the High-speed Shutter

When you record a fast-moving subject, choose a higher shutter speed. The movement will look clearer when played back in the pause mode. Remember that you need enough lighting to use high speed shutter.

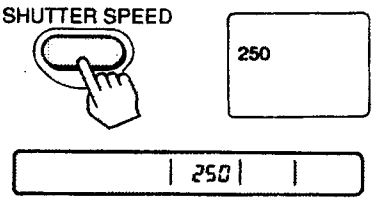


How to select the shutter speed



1 **Set AUTO LOCK to the lower position.**
Make sure that neither 🎥 nor 🔦 appears in the display window.

2 **Press SHUTTER SPEED repeatedly until the desired shutter speed indication appears.**



→ No indication (1/60) → 100 (1/100) → 250 (1/250) →
4000 (1/4000) ← 2000 (1/2000) ← 1000 (1/1000) ←

How to choose best shutter speeds

Example use	Recommended shutter speed
• On clear days, recording golf or tennis swing (To view the hit ball clearly in the still picture mode, set to 1/4000) • Recording skiers	1/4000 or 1/2000
• On overcast days, recording a moving carousel or roller coaster • Recording outdoors from inside a moving vehicle (for stable shooting)	1/1000 or 1/250
• Instead of the ND2 filter (To reduce the exposure level to about a half) • Recording indoor sports (for stable shooting)	1/100

Notes

- When you select shutter speed 1/250 or faster, record under sunlight or use a video light.
- When you record a TV screen with certain shutter speeds, the brightness of the recorded picture may vary.
- When you shoot a very bright subject at a faster shutter speed, a light vertical, belt-like line ("smear") may appear on the screen.
- When you record at certain shutter speeds under a light discharged tube, such as a fluorescent lamp, sodium lamp or mercury lamp, the brightness of the recorded picture may vary.

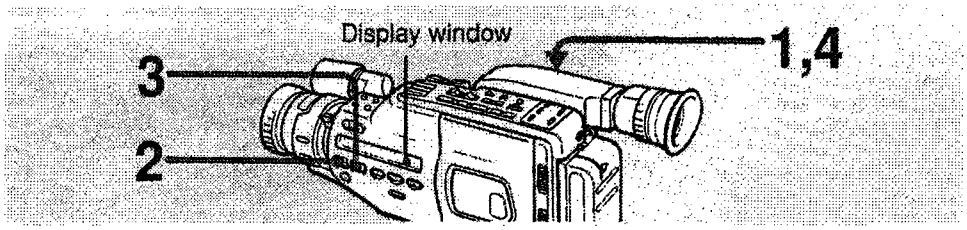
Using the Portrait Mode

In the portrait mode, the object is in focus and the background is out of focus. Therefore, you can use this mode to highlight the subject. The opening of the iris and the shutter speed is automatically adjusted to maintain the appropriate exposure according to the size and brightness of the object. The portrait mode is most effective to be used outdoors.

You may want to use the portrait mode when shooting the following subjects:

- a still subject such as person or flower
- zooming in a subject in the telephoto mode
- subjects behind such obstacles as net

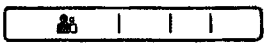
How to set to portrait mode



1 **Push the cover of the red button up until it snaps into STANDBY.**

2 **Set AUTO LOCK to the lower position.**

3 **Press PROGRAM AE until appears in the display window.**



4 **Press START/STOP.**
Recording with the portrait mode starts.

To resume the automatic mode

Press PROGRAM AE until neither nor appears in the display window or set AUTO LOCK to the green position.

Hint for effective camera work

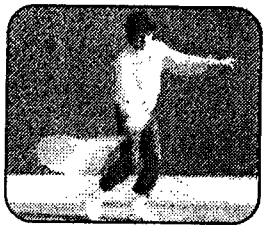
Use of the portrait mode in the following method will gradually bring the background out of focus while keeping the object in focus.

1 Enter the portrait mode.
2 Set AUTO LOCK to the green position and start recording.
3 Set AUTO LOCK to the lower position.
The camcorder will enter the portrait mode and brings the background out of focus.

Note

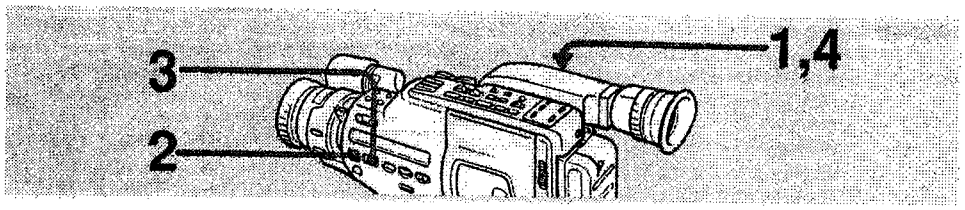
When recording under fluorescent, sodium, or mercury lamp, the brightness of the recorded picture may vary, or the color of the recorded picture may become unnatural.

Using the Sports Mode



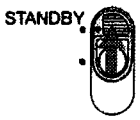
In the sports mode, you can record subjects moving at high speed clearly, providing a high-quality picture minimum blur in the slow and still playback modes. The shutter speed and the opening of the iris is automatically adjusted to maintain the appropriate exposure according to the speed of the object. The sports mode provides more effective recording than you can achieve by using the SHUTTER SPEED button.

You may want to use the sports mode when shooting the following subjects:
- outdoor sports scene such as football, tennis or golf
- recording a landscape in a moving car



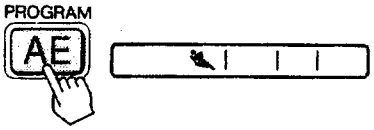
How to set to sports mode

1 **Push the cover of the red button up until it snaps into STANDBY.**



2 **Set AUTO LOCK to the lower position.**

3 **Press PROGRAM AE until appears in the display window.**



4 **Press START/STOP.**
Recording with the sports mode starts.

To resume the automatic mode

Press PROGRAM AE until neither nor appears in the display window or set AUTO LOCK to the green position.

Hint for effective camera work

When shooting sports event from a distance, such as a football game, we tend to zoom from the wide to the telephoto position to catch the one-time events. Even under these circumstances, by using the sports mode, you can get a sharp picture when played back later in the slow or still mode.

Notes

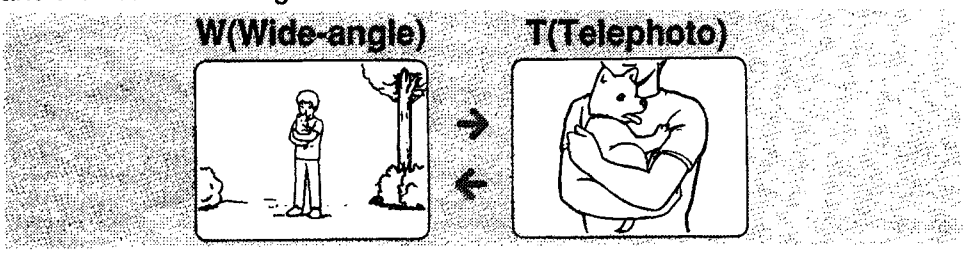
- The sports mode is effective under sufficient lighting, such as under sunlight. When used under extremely dark conditions, the shutter speed may not be shifted to high speeds.
- When recording under fluorescent, sodium, or mercury lamp, the brightness of the recorded picture may vary, or the color of the recorded picture may become unnatural.

Using the Special Effects

You can get a professional-looking home video using these sepcial effects; zoom, close-up, fade-in and fade-out.

Zooming

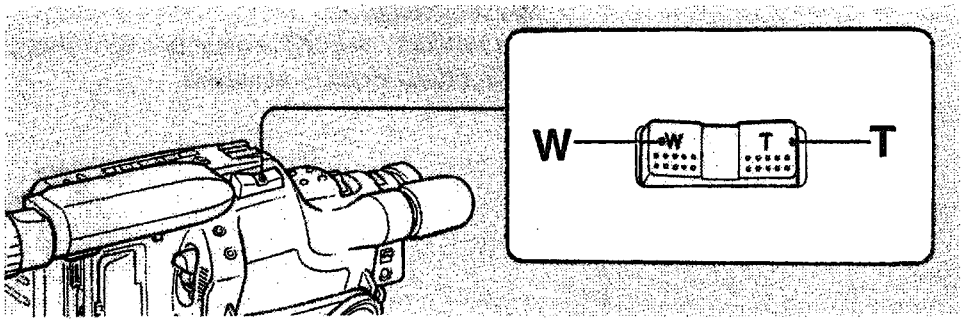
You can change the size of the subject in the scene. Use zooming to focus manually or to decide the shooting angle. Also use "zoom-in (Telephoto)" for dramatic close-ups. Use "zoom-out (Wide-angle)" for panoramic long shots. Most common mistake, however, is using zoom-in or zoom-out too often during recording. For natural recording, you may want to set the zoom first and then start recording.



You can zoom using motorized power zoom or manually with zoom lever.

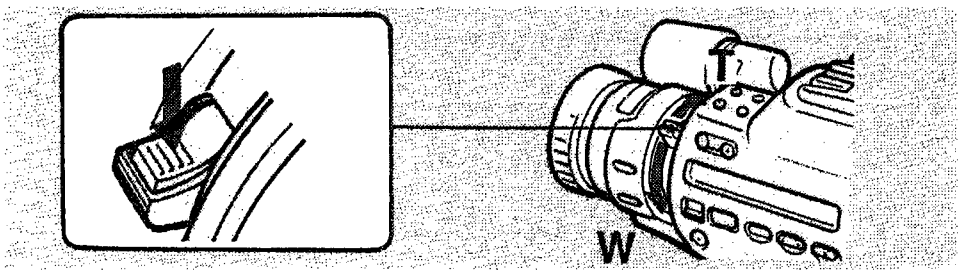
Power zooming

Use the power zoom for smooth and constant zooming.
Press the T side of the power zoom button for telephoto (subject appears closer) and the W side for wide-angle (subject appears farther away).



Zooming manually

Use the manual zoom to create a dramatic effect or to change zoom angle quickly.
Turn the manual zoom lever upward for telephoto and downward for wide-angle.
Be sure to keep pressing the gray button on the lever when turning it downward.



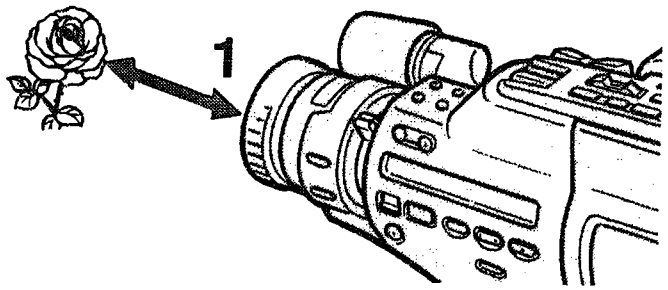
Focal length of this camcorder

The focal length is 8.5 mm to 68 mm ($^{11}/_{32}$ to $2^{3}/_{4}$ inches). This means approximately 46 mm to 368 mm ($1^{3}/_{4}$ to $14^{3}/_{8}$ inches) converted into the focal length of a 35-mm still camera.

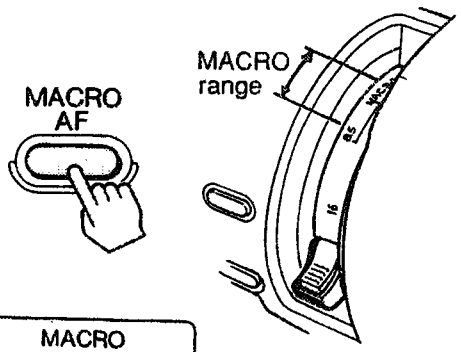
Close-up (Autofocusing in Macro)

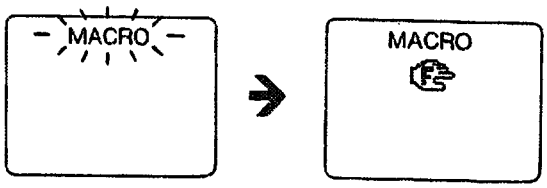
Even small subjects, such as flowers, insects and photographs can fill the screen with autofocusing in macro.

1 **Bring the camcorder as close as necessary to obtain the desired subject size.**
This subject can be as close as a minimum of 10 mm ($^{13}/_{32}$ inches) from the lens surface.



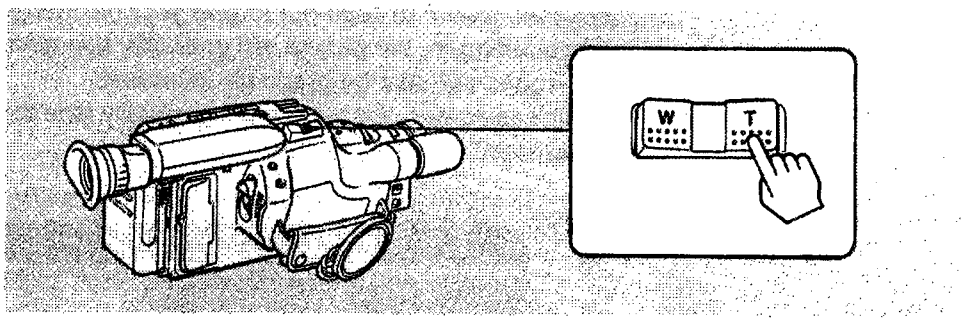
2 **Press MACRO AF.**
The MACRO indication blinks in the viewfider and the zoom lever turns automatically to the MACRO range.
The MACRO and indications light steadily when sharp focus is achieved.





To release this adjustment setting

Press the T side of the power zoom button or return the zoom lever to the ordinary range.



If the MACRO indication lights before focusing sharply

The MACRO indication lights steadily if sharp focus cannot be achieved within 30 seconds. In this case, press MACRO AF again to re-function autofocusing in macro.
If you still do not get a sharp focus, manual focusing is recommended (see page 30). Adjust it after the MACRO indication lights steadily.

To keep autofocus functioning

Keep MACRO AF pressed.
Contrary to the normal autofocusing, autofocusing in macro is released each time the sharp focus is achieved.

Notes

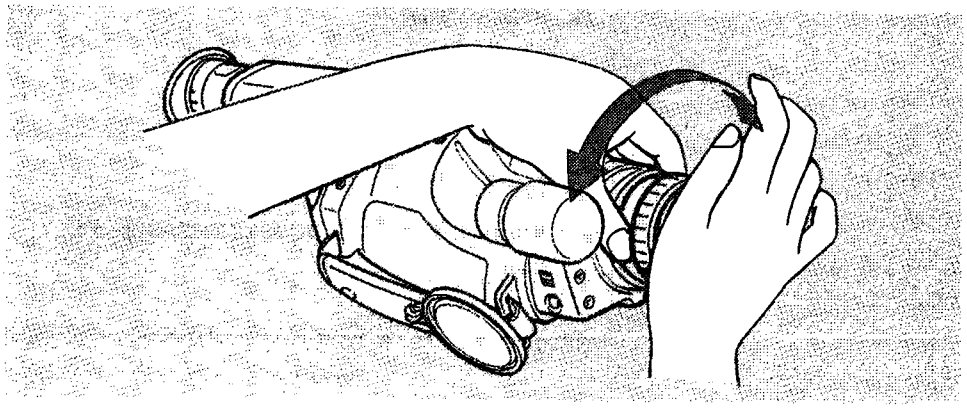
- This function has no connection with the AUTO LOCK switch. You can use autofocusing in macro while manually adjusting the ordinary focus, etc.
- Do not press the power zoom button while the zoom lever is moving for autofocusing in macro. Otherwise, autofocusing is released.

Manual focusing in macro

1 Turn the zoom lever to the MACRO range without pressing the gray button on it.
The MACRO indication lights up in the viewfinder.
2 Turn the zoom lever within the MACRO range to focus sharply.

If the lens hood touches the subject

Remove the lens hood. Hold the focus ring and turn the hood by pressing it with your palm. Do the same when attaching/removing a filter or conversion lens (not supplied).

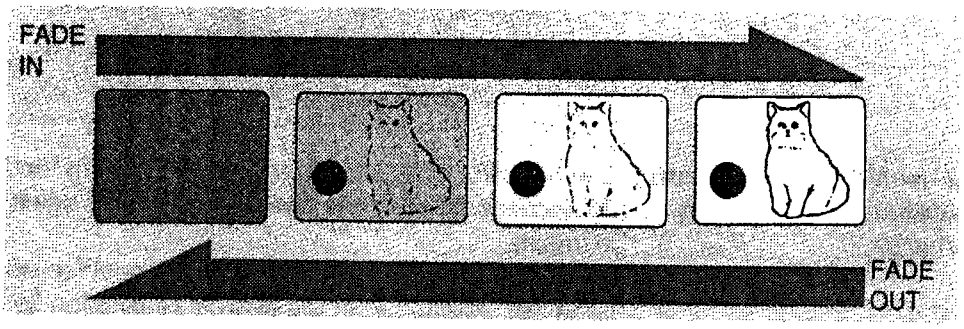


Recommeded accessory

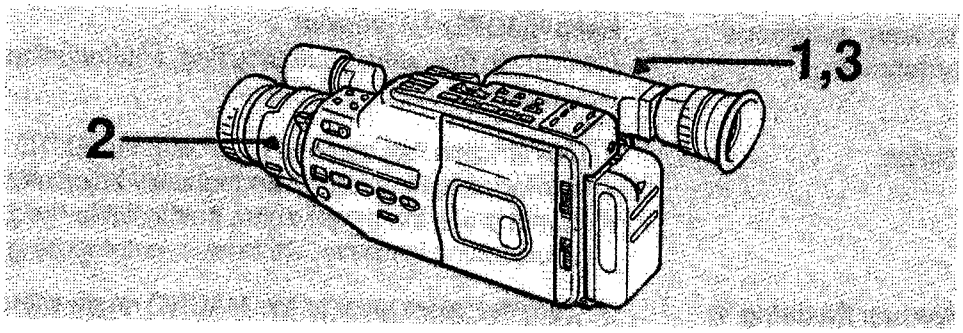
When shooting in macro, the depth of field is very shallow, so pay attention to focusing. To keep the subject in focus, use a tripod.

Fade-in and Fade-out

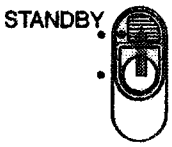
You can fade-in or fade-out to give your recording a professional appearance.
When fading-in, the picture will gradually appear from black.
The sound will also be gradually increased.
When fading-out, the picture will gradually fade to black. The sound will be decreased.



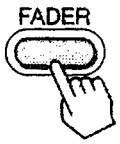
To fade-in



1 **Push the cover of the red button up until it snaps into STANDBY.**

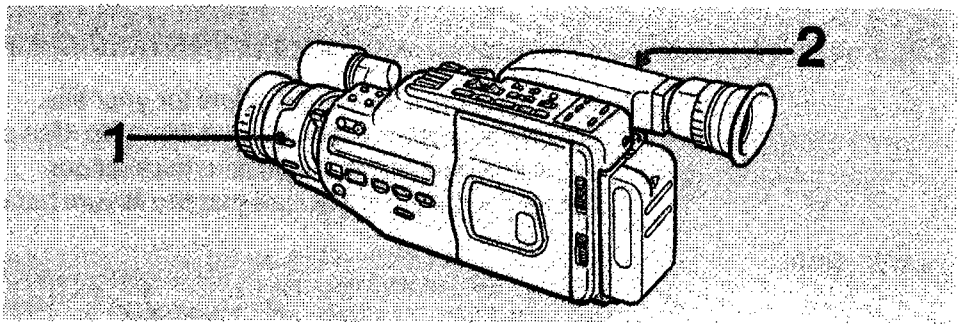


2 **Press FADER.**

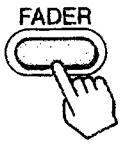


3 **Press START/STOP.**
Fade-in is performed and recording will start.

To fade-out



1 **While recording, press FADER.**



2 **Press START/STOP to stop recording.**
Fade-out is performed and then recording stops.

To cancel the fade-in/out function

Before pressing START/STOP, press FADER again.

If you want to use the fade-in/out function repeatedly

Start from step 1 each time.

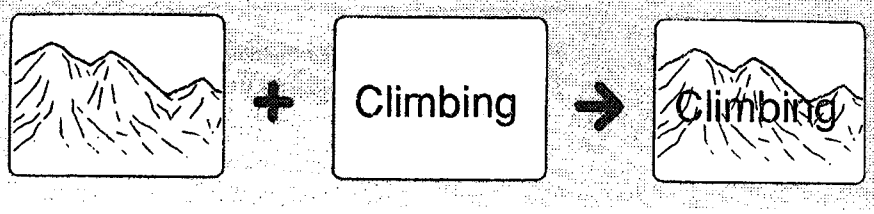
When the date/time (page 22), title (page 44), or age (page 49) is displayed

The title, date/time, or age does not fade-in or fade-out.

Superimposing Text

You can superimpose your own hand-written message or graphics over the scene during recording or playback. You can also superimpose how many years and months have passed since your child's birthday, or the date of a memorable occasion. Remember that information you want to superimpose must first be stored in the camcorder.

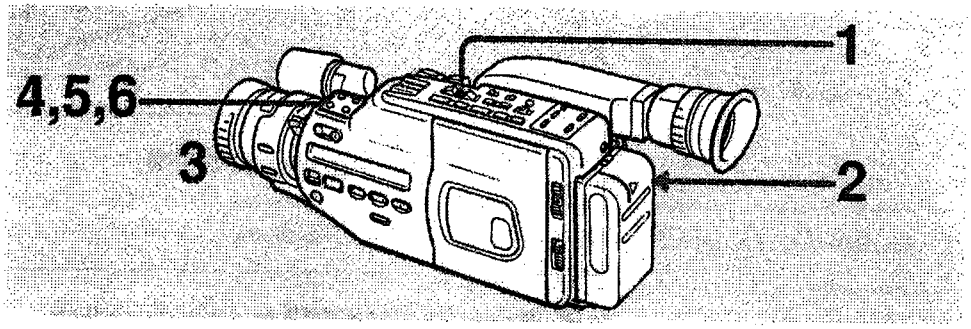
Title superimposing



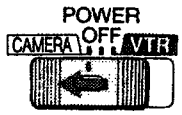
Storing a Title in Your Camcorder

You can choose from eight colors for your title.
Before you store the title, make a title card. Use plain, white card and write a title with a dark-colored marker in thick letters.
Before you begin, make sure that the lithium battery is installed.

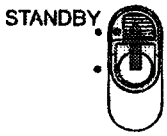
How to store



1 **Press the small green button on POWER and slide POWER to CAMERA.**

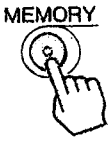


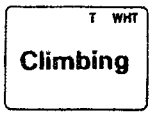
2 **Push the cover of the red button up until it snaps into STANDBY.**



3 **Point the camcorder to the title card and adjust the focus.**

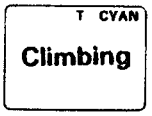
4 **Press MEMORY to store the title.**





5 **Press COLOR/MODE to select the title color.**
Each time you press the button, the indication changes as follows.

→WHT (white) → BLUE → GRN (green) → CYAN → RED
└BLK (black) ← YEL (yellow) ← VIO (violet) ←┘



6 **Press ON/OFF to turn off the title.**

To check the title

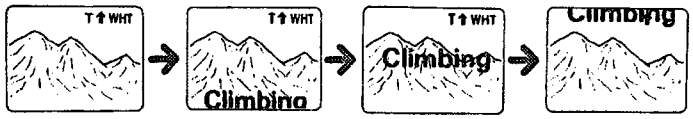
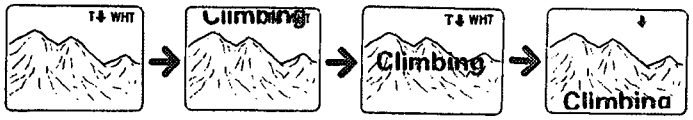
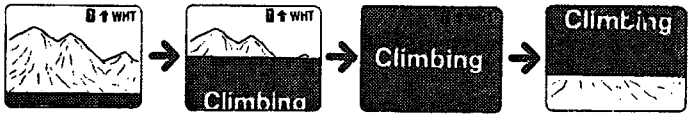
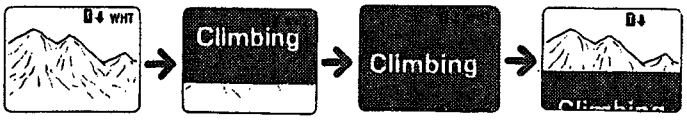
Press ON/OFF in the standby mode.
To turn off the title, press the button again.

Putting a Title on Your Tape

What you can do with the title

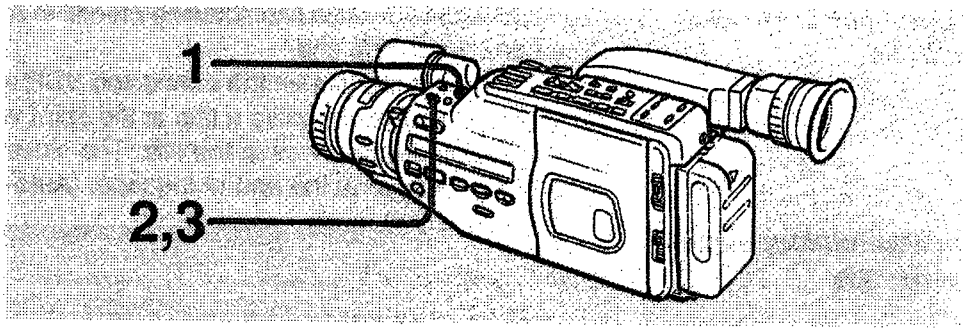
- You can scroll your title like scrolling credits in a movie.
- You can reverse the title.
- You can record the title on the connected VCR when you edit a tape.
- In addition to superimposing a title at the point you want, you can automatically display or clear the title. The nicest way to use this method is at the beginning or at the end of the tape. (Auto-superimposing)

Various display modes of the title

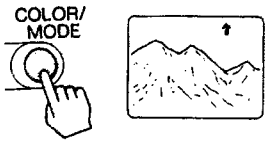
Display mode	Indication in the viewfinder
Scrolling up the title The title scrolls up and stops at the center. 	↑
Scrolling down the title The title scrolls down and stops at the center. 	↓
Reversing the title with the picture 	T
Scrolling up the reversed title 	T↑
Scrolling down the reversed title 	T↓
Normal display mode	No indication
Auto-superimposing	⌞ AUTO

How to superimpose

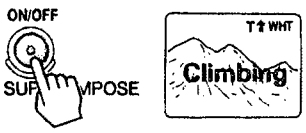
The following shows how to superimpose text using an example in which the title in white scrolls up.



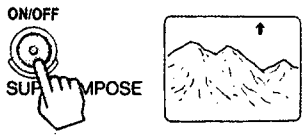
1 **Press COLOR/MODE to select the display mode of the title in the standby or playback pause mode.**
(For display modes, see page 43.)



2 **Press ON/OFF at the point you want to insert the title in the standby mode, during recording, in the playback pause mode or during playback.**
You can change the title color by pressing COLOR/MODE. Each time you press the button, the color indication changes.



3 **Wait for a while and press ON/OFF again.**
The title will go out.



About the color and the display mode indications

The color and the display mode indications in the viewfinder are not recorded.

If you press EDITSEARCH in standby made

The title goes out. After performing the editsearch or recording review function, the title appears again.

Note on scrolling

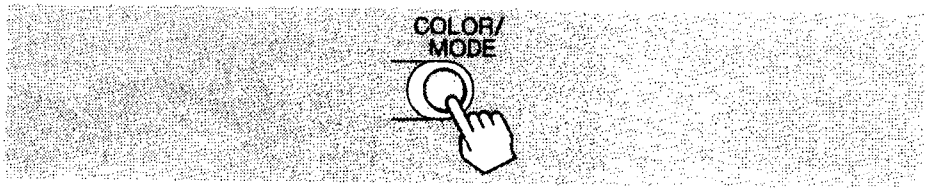
You can scroll the title only when the camcorder is in the recording standby, recording, or normal playback mode. In the other modes (see "Playing Back a Tape in Various Speeds" on page 52), you can select only reversing (◧) or normal display mode. Also scrolling will be cancelled when you set the camcorder in the other modes after selecting scrolling.

About memory back up

The camcorder uses the lithium battery on the bottom to keep the title in memory. The lithium battery life is approximately 1 year.

Function of the COLOR/ MODE button

This button has a double function: one is to select the title color and the other is to select the title display mode.
Its function depends on if the title is displayed or not.



To select the color

1 Press ON/OFF to display the title.
2 Press COLOR/MODE.
Each time you press the button, the color indication changes as follows:
WHT (white) → BLUE → GRN (green) → CYAN → RED
↑— BLK (black) ← YEL (yellow) ← VIO (violet) ←—┘

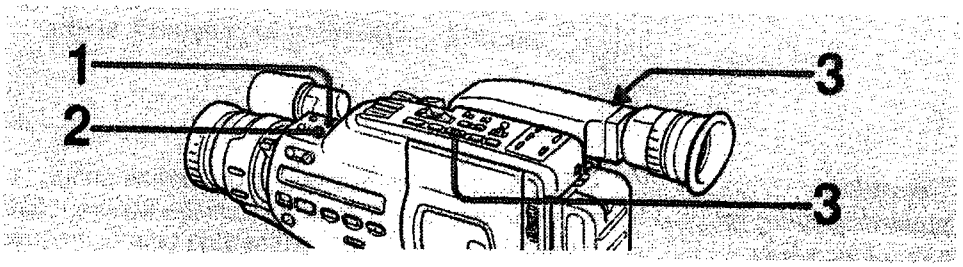
To select the display mode

1 If the title is displayed, press ON/OFF so that the title disappears.
2 Press COLOR/MODE.
Each time you press the button, the mode indication changes as follows:
No indication (normal mode) → ↑
↑—▯↓ ← ▯↑ ← ▯ ← ↓ ——┘

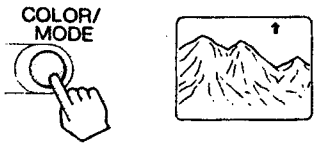
↑ : Title scroll up mode
↓ : Title scroll down mode
▯ : Title reverse mode
▯↑ : Title reverse and scroll up mode
▯↓ : Title reverse and scroll down mode

Superimposing a title at the beginning

You can clear the title automatically after displaying it for a few seconds. (Auto-superimposing)

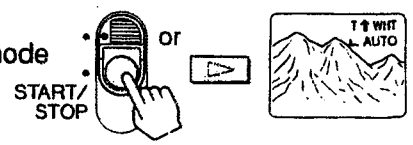


1 Press COLOR/MODE to select the display mode of the title in the standby or playack pause mode.



2 Press AUTO.

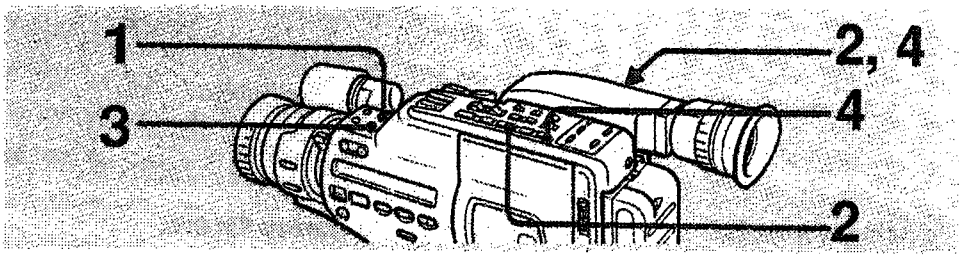
3 Start recording or playback.
The title is displayed in the selected mode and disappears after a few seconds automatically.



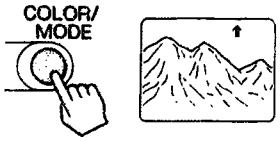
Superimposing Text

Superimposing a title before the tape stops

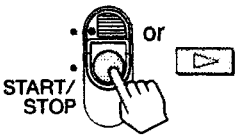
You can display the title automatically for a few seconds after pressing START/STOP or ⏸ PAUSE to stop recording or playback. (Auto-superimposing)



1 **Press COLOR/MODE to select the display mode of the title in the standby or playback pause mode.**

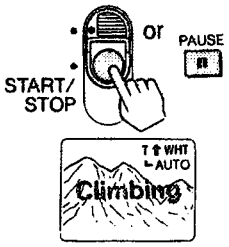


2 **Start recording or playback.**



3 **Press AUTO.**

4 **Press START/STOP or ⏸ PAUSE at the point which you want to stop recording or playback. After the title is displayed for a few seconds, recording or playback stops.**



The auto-superimposing is cancelled when

- The auto-superimposing is performed once.
- You press AUTO again before the superimposing is performed.
- Other operation (e.g. editsearch or various speed playback) is done in the standby or playback pause mode.
- You press ON/OFF before superimposing is performed.

Storing a Birth Date in Your Camcorder

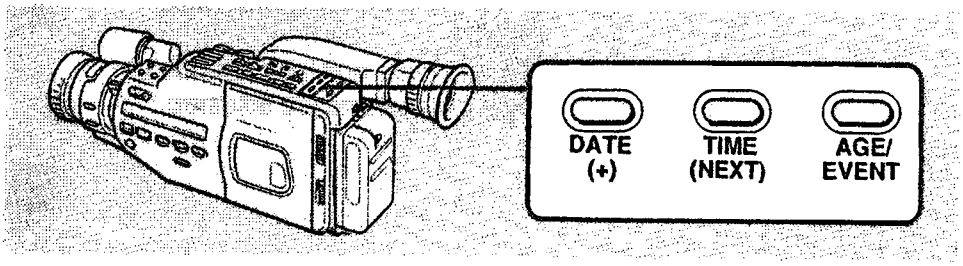
When you preset your child's birth date in the camcorder, you can put your child's age in years and months on your tape. You can also preset the date of an event. Once you enter the birth date of your child, the clock inside the camcorder will automatically update age of your child. You can superimpose the age anytime on your recording.You can preset up to three birth dates or events.

Before you begin

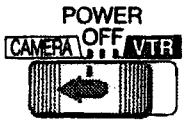
Before you store a birth date in your camcorder, make sure that power source is connected, that the lithium battery is installed and that the date is correctly set.

How to store birth date

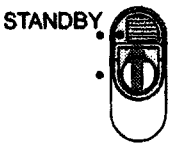
To store a birth date in your camcorder, see the following example and procedure.
Example: Store "Aug. 3, 1987" in memory 2.



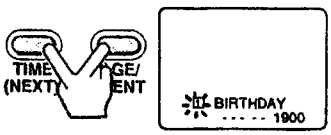
1 **Press the small green button on POWER and slide POWER to CAMERA.**



2 **Press the cover of the red button up until it snaps to STANDBY.**



3 **Press TIME (NEXT) and AGE simultaneously for more than one and a half seconds until the "[1] BIRTHDAY--- -- 1900" indication appears in the viewfinder.**



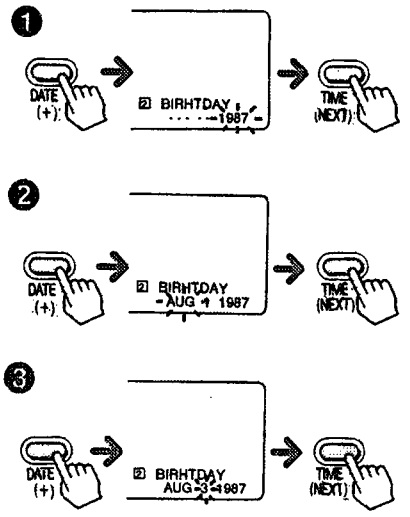
4 **Press DATE (+) to select [2].**
Each time you press DATE (+), the display in the viewfinder changes as follows:
[1] BIRTHDAY → [2] BIRTHDAY
↑ [3] EVENT* ←

* Although "EVENT" is displayed on [3], you can use it for age as well.
[1] and [2] can also be used for event.

5 **Press TIME (NEXT).**
The "1900" indication blinks.

(To be continued)

6 Enter the birth date of your child.
First adjust the blinking digits with DATE (+), and then press TIME (NEXT).
The age (year and month) appears when all the items are adjusted.



If you missed the correct number with DATE (+)

Keep pressing DATE (+).
The indication changes as follows:
Year: 1900 → 1901 → Current year
↑ Current year – (minus) 99 ↵

Month: JAN. → FEB. - - - → DEC. → --
↑

Day: 1 → 2 - - - → 31
↑

To correct/change the setting

Follow the procedures from step 1 again.

To advance the digits faster

Keep DATE (+) pressed.

To preset the year before 1900

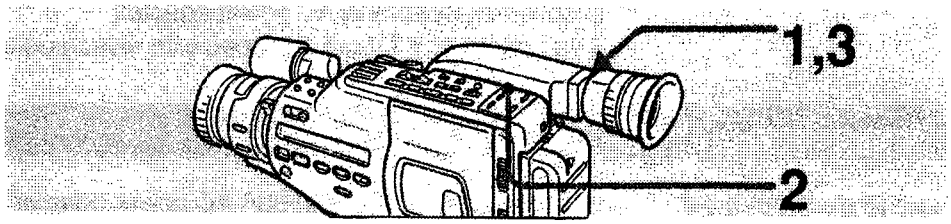
1 After step 5 on page 47, keep pressing DATE (+) until the current year is displayed.
2 Press DATE (+) again.
The year goes back 99 years.
(example: 1990 → 1891)
3 Go to step 6 above.

When in 2000

"--- --1901" is displayed in step 3 on page 47. After that, it advances every year as "1902, 1903, ... ".

Putting an Age on Your Tape

You cannot add the age later during playing back or editing. Be sure to follow the procedure below.



1 **During recording, press START/STOP at the point where you want to insert the age of a person or the elapsed time.**
The camcorder is set in standby mode.

2 **Press AGE to select the indication you want to record.**
Each time you press AGE, the indication changes as follows:

No indication → [1] The first age
↑ ↓
[3] The third age ← [2] The second age

An item with no presetting is skipped.
The [1], [2], or [3] indication goes out after one second.

3 **Press START/STOP.**
Recording starts again.
The indication in the viewfinder is recorded with the picture.

To stop recording the age

Press AGE until the indication goes out.

To change the display while recording

Press AGE until the indication you want to record is displayed. Recording of the indicator you select starts when [1], [2], or [3] goes out.

To cancel the stored birth date

1 Perform steps 1 to 4 in "Storing a birth date in you camcorder" to select the memory number to be canceled.
2 Press TIME (NEXT) twice. The month indication blinks.
3 Press DATE (+) until "--- --" appears.
4 Press TIME (NEXT).
The birth date is deleted from the memory and is not displayed when you press AGE.

About memory back-up

The camcorder uses the lithium battery on the bottom to keep the birth date in memory. The lithium battery life is approximately 1 year.

When you connect the camcorder to a TV during recording

If you do not use the data-screen function, the age indication will appear on the TV screen when the [1], [2], or [3] indication goes out in the viewfinder and recording starts.

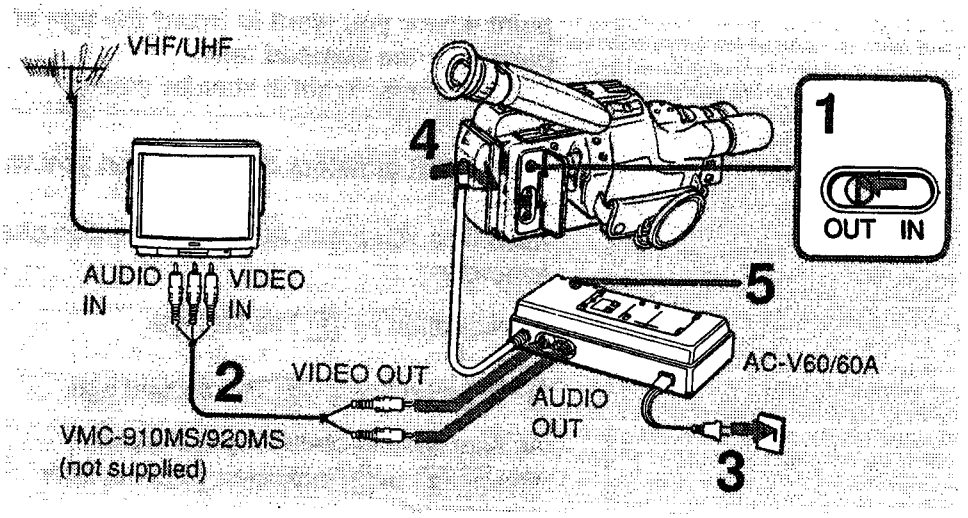
Playing Back

In the earlier section (page 14), we've explained the basic connection to your TV.
Here, we will talk about several other ways of connection to TV depending on the type of TV you have.
You can easily make a proper connection of camcorder and TV by using the supplied AC-V60/60A AC power adaptor.
If you connect a TV not equipped with video/audio inputs, see page 14.

Connecting a TV with Video/Audio Inputs

How to connect a TV with video/audio inputs

Use the supplied AC-V60/60A AC power adaptor and A/V connecting cable to connect to the TV. Make sure that the TV is turned off to prevent damage to the speaker.



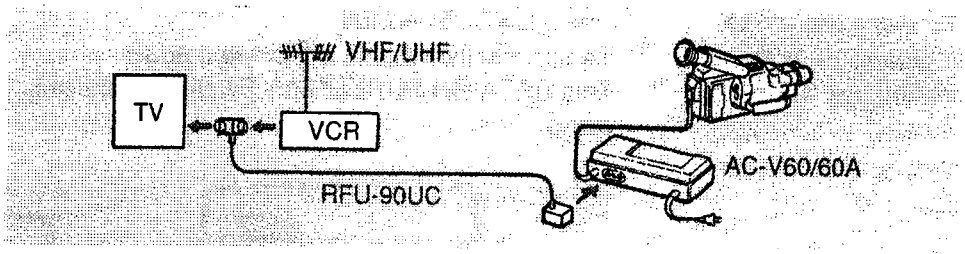
1 Set the IN/OUT selector to OUT.
2 Connect Video and Audio using the A/V cable between TV and AC power adaptor.
If your TV is a monaural type, use the VMC-710M/720M A/V connecting cable (not supplied).
3 Connect the AC power adaptor to a wall outlet.
4 Attach the connecting plate of the AC power adaptor to the camcorder.
5 Set the CHARGE/VTR selector on the AC power adaptor to VTR (DC OUT).

Note
Perform only steps 4 and 5 when playing back a tape. You can keep the AC power adaptor and the TV connected when playing back a tape.

Connecting to a TV via a VCR

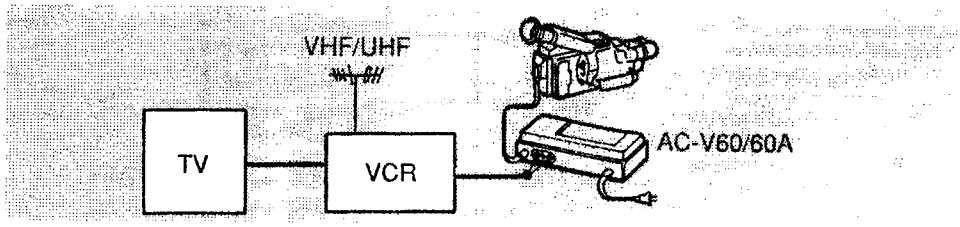
If your TV has no VIDEO/AUDIO input jacks

Disconnect the antenna connection between the TV and the VCR, and connect the RFU adaptor to the VHF/UHF input of the TV and VHF/UHF output of the VCR.



If your TV has VIDEO/ AUDIO input jacks

Connect Video and Audio from the AC power adaptor to the VCR instead of to the TV. Set the input selector of the VCR to LINE, if available.

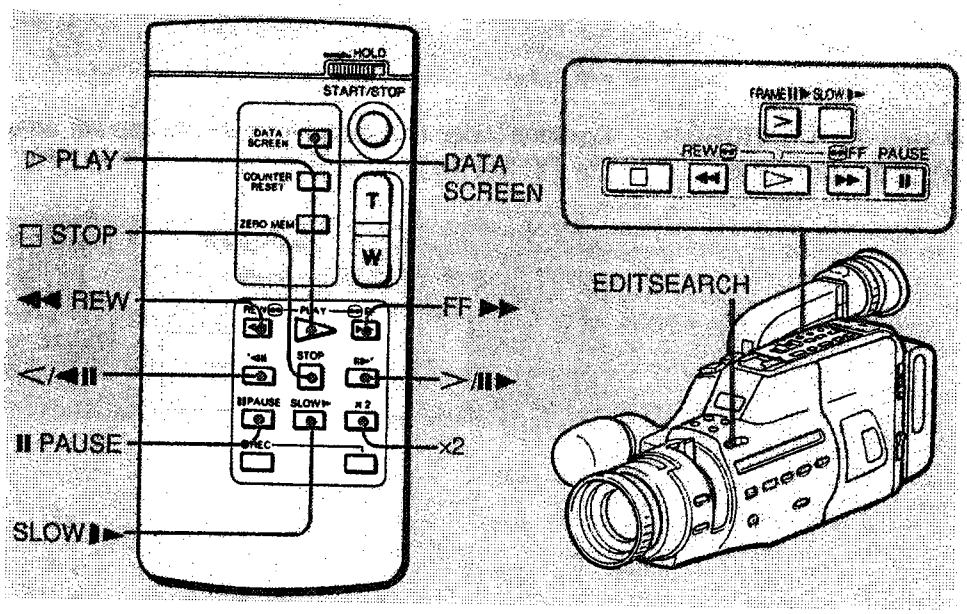


Playing Back a Tape in Various Speeds

The supplied wireless Remote Commander is useful to control the camcorder from a distance. When using it, be sure to set the REMOTE COMMANDER switch to ON.

To make the same indications in the viewfinder on the TV

Press DATA SCREEN.
To turn the indications off, press it again.
This DATA ON SCREEN on TV will tell you which playback mode you are using.



To view the still picture (playback pause)

Press II PAUSE during playback.
II appears in the viewfinder.
To resume normal playback, press ▷ or II.

Note
When the still picture mode lasts for 5 minutes or more, the camcorder automatically enters the stop mode.

To change the playback direction

Press < /◀II for the reverse or > /II▶ for the forward direction during playback. > on the camcorder is only for the forward direction.
–x1 or x1 appears in the viewfinder.

To view the picture at 1/5 speed (slow playback)

Select the playback direction with < /◀II or > /II▶, and then press ▮► SLOW during playback.
▮► SLOW on the camcorder is only for the forward direction.
◀▮ or ▮► appears in the viewfinder.

Note
To resume normal playback, press ▷.
When slow playback lasts for 1 minute or more, the forward or reverse playback at the normal speed starts automatically, depending on the tape direciton.

To view the picture at double speed (only on the Commander)

Select the playback direction with < /◀II or > /II▶, and then press x2 on the Commander.
–x2 or x2 appears in the viewfinder.
To resume normal playback, press ▷.

To view the picture frame-by-frame

In the still picture mode, press < /◀II or > /II▶. Each time you press the button, the picture appears by a frame.
II▶ on the camcorder is only for the forward direction. ◀II or II▶ appears in the viewfinder.
If you keep pressing ◀II/II▶, playback at 1/30 speed starts.
To resume normal playback, press ▷.

To locate the desired scene (picture search)

Keep pressing ◀◀ or ▶▶ during playback or in the still picture mode. ⏪ or ⏩ appears in the viewfinder.
To resume normal playback, release the button.

To locate the desired scene quickly (skip scan)

Press ◀◀ during rewinding or ▶▶ during advancing the tape rapidly. ⏪ or ⏩ appears in the viewfinder.
To resume normal playback, press ▷.

About the playback picture

During the various playback modes, streaks appear on the screen.

About the sound during playback in the various playback mode

The sound can be heard during playback at double speed in forward direction, but sound may not be clear as normal speed playback.

If the still picture, frame-by-frame picture, or slow playback picture is noisy

Set the camcoder into the slow playback mode, and press "+" or "–" side of EDITSEARCH on the camcorder until you get the best picture.

If the still picture shakes

Press "+" or "–" side of EDITSEARCH on the camcorder until the most stable picture appears.

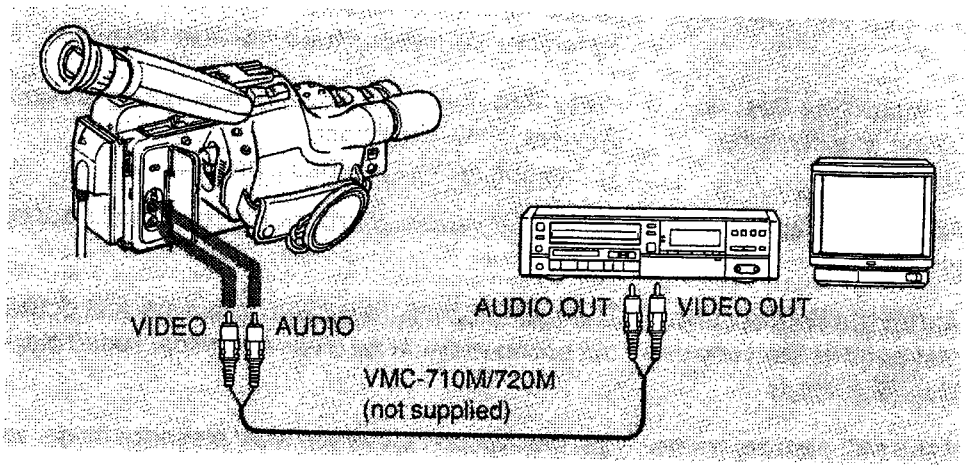
Recording

Recording from a VCR or TV

You can record a tape from another VCR or a TV program from the TV both equipped with video/audio outputs.

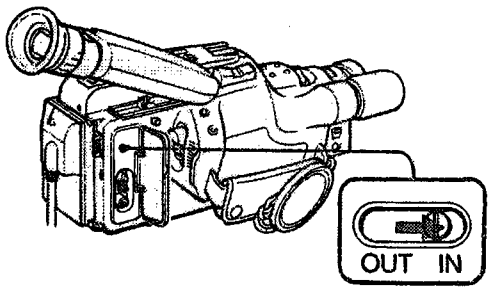
How to connect

Disconnect the RFU adaptor from the AC power adaptor if it is connected. Make connection using the appropriate A/V cable (such as Sony VMC-710M/720M for monaural equipment or VMC-910MS/920MS for stereo equipment).



How to record

1 **Set the IN/OUT selector on the camcorder to IN.**



2 **Turn on the VCR or TV.**

3 **Play back the tape or select the TV channel to be recorded.**

4 **Set POWER of the camcorder to VTR.**

5 **Insert a tape and slide ● REC.**
Recording starts. You can monitor the picture being recorded in the viewfinder.

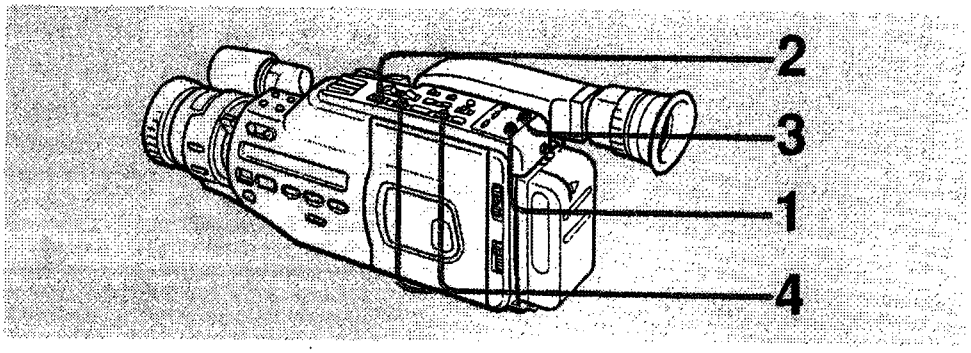
Using the Tape Counter

During recording or playback, the digits on the counter indicate the actual recording or playback time.

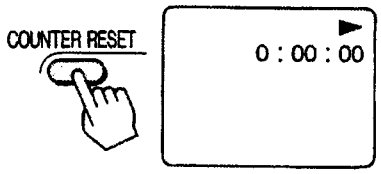
To count the whole tape

Press COUNTER RESET at the beginning of the tape so that the counter shows "0:00:00". Write down the counter reading at a particular point so that you can easily find that point later by referring to the tape counter.

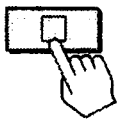
To return to a pre-registered point



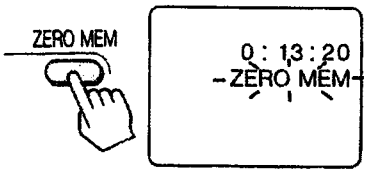
1 **During playback, press COUNTER RESET at the point you later want to locate.**
The counter shows "0:00:00".



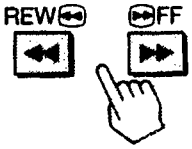
2 **Press □ when the playback has finished, as usual.**



3 **Press ZERO MEM.**
The "ZERO MEM" indication blinks in the viewfinder.
Be sure to press ZERO MEM after you stop the tape. It does not function during recording or playback.



4 **Press ◀◀ or ▶▶.**
The tape rewinds or advances and stops automatically when the counter reaches approximately zero.



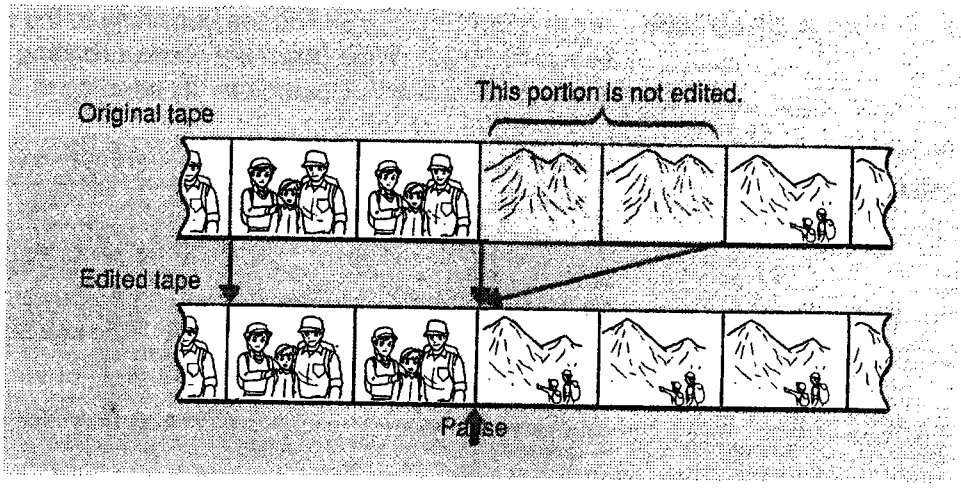
Notes on the tape counter and the ZERO MEM button

- Something must be recorded on the tape in order for the tape counter to function.
  Tape counter will not work on blank tape.
- The counter reading and the point of the tape may not correspond exactly. Use the counter as a guide.
  There will be a time lag of several seconds especially when you repeat fast-forward running/rewinding and play back the tape recorded in LP and SP modes mixed.
- The ZERO MEM mode is cancelled automatically once the tape is rewound or sent forward to the point where you pre-registered.

Editing

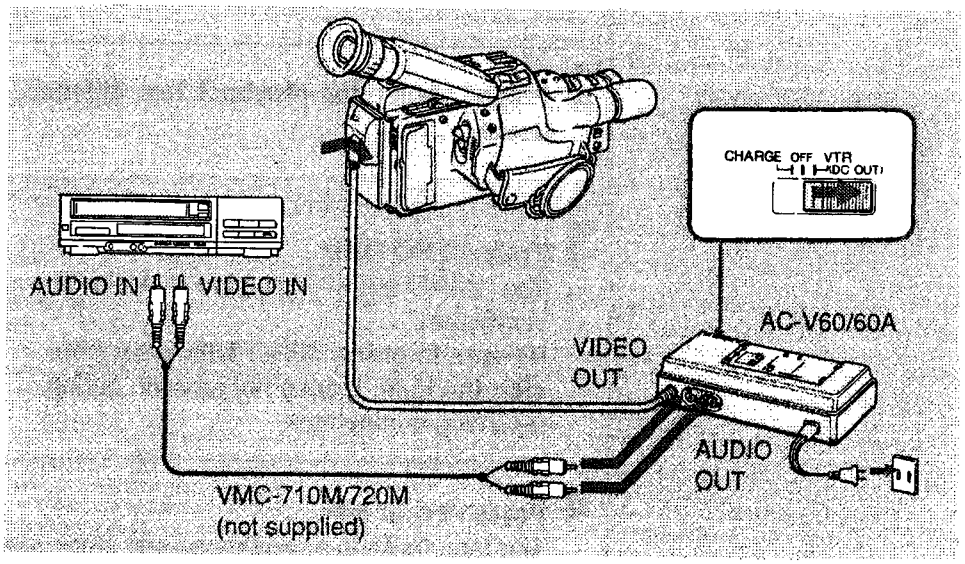
Editing Tapes with a VCR

You can edit a tape with an additional 8 8mm, β Betamax or VHS VHS format VCR. Also you can superimpose and record the titles.



How to connect

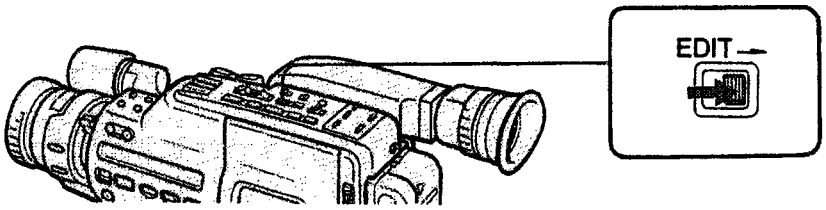
Make connections using the appropriate A/V cable (such as Sony VMC-710M/720M for monaural VCR or VMC-910MS/920MS for stereo VCR) and set the CHARGE/VTR selector on the AC power adaptor to VTR. Set the input selector of the VCR to LINE, if available.



How to edit

1 **Insert a tape to be recorded into recording VCR.**

2 **Slide EDIT on the camcorder to the direction of the arrow.**



3 **Set POWER of the camcorder to VTR, then insert the recorded tape.**

4 **Play back a tape on the camcorder until you locate the point where you want to start editing, then set the camcorder to the playback pause mode.**

5 **On the recording VCR, locate the recording starting point and set the VCR to the recording pause mode.**

6 **Press II PAUSE of the camcorder and VCR simultaneously to start editing.**

Note on auto-superimposing

When performing synchronized editing using the connector, you cannot superimpose a title at the end of the editing by pressing AUTO.

To edit more scenes

Repeat steps 4 to 6.

To stop editing momentarily

Press II on the recording VCR.

To stop editing

Press □ on both VCRs.

To record a title

You can superimpose and record the titles on the picture while editing. For details, refer to pages 41 to 46.

If you use the DATA SCREEN function

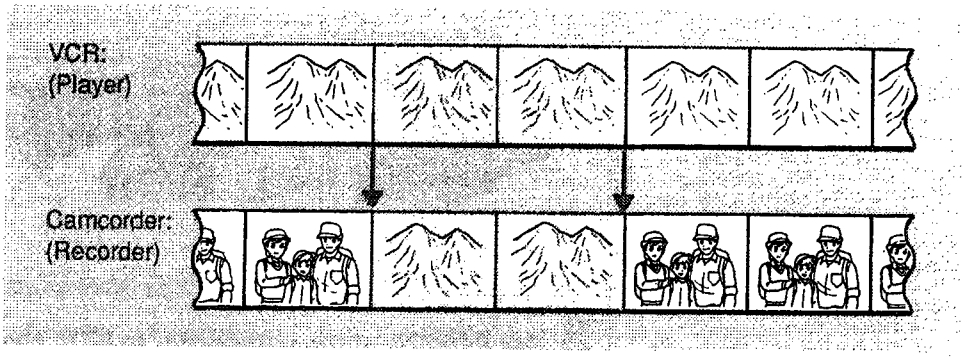
The indications displayed on the TV screen will also be recorded.

Use of the EDIT switch

When you set EDIT to the direction of the arrow (EDIT ON), you can keep picture and sound deteriorations resulting from editing to the minimum. Avoid using the edited tape for multiple generations of editing. After editing, be sure to set this switch in the opposite direction of the arrow (EDIT OFF).

Replacing Recordings on a Tape (Insert Editing)

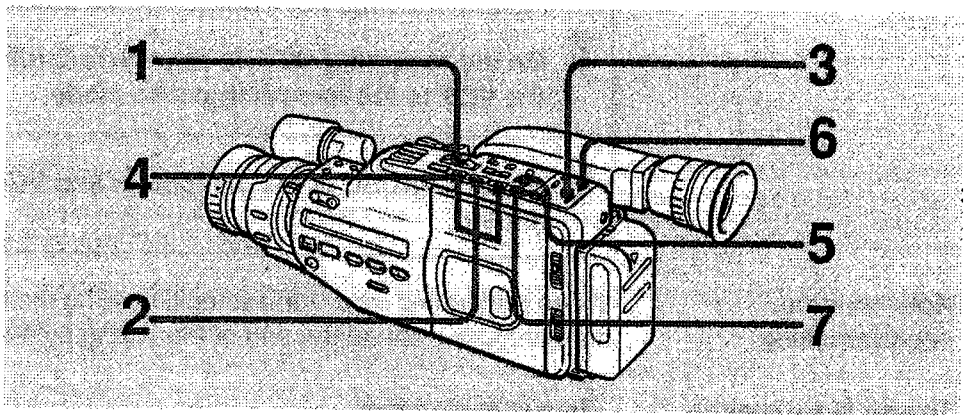
You can insert a new scene from a VCR on your originally recorded tape by setting the starting point and ending point.



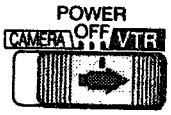
How to connect

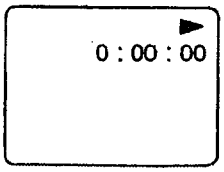
Connections are the same as in "Recording from a VCR or TV (page 54)." Before you begin replacing recordings, **set the VCR to the playback pause mode at the beginning of the scene to be recorded.** Set the CHARGE/VTR selector on the AC power adaptor to VTR.

How to replace recordings

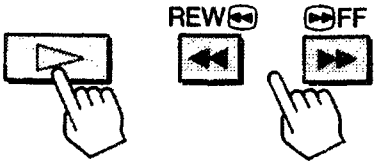


1 **Press the small green button on POWER and slide POWER to VTR.**
The counter appears in the viewfinder.

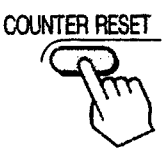


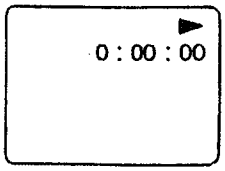


2 **Locate the end point where the insert should end by pressing ◀◀ or ▶▶ during playback.**



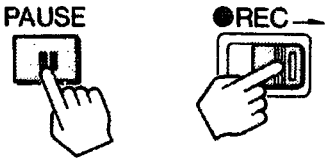
3 **At the end point, press COUNTER RESET.**
The counter is reset to "0:00:00".



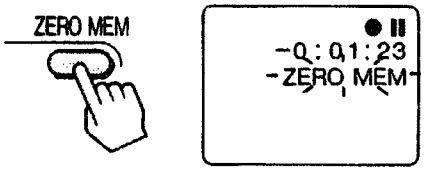


4 **Locate the start point where the insert should begin by pressing ◀◀.**

5 **At the start point, set the camcorder into recording pause mode.**



6 **Press ZERO MEM.**
The end point of the insert is stored in memory.



7 **Press II of both units to start insert editing.**
You can monitor the picture being inserted in the viewfinder screen.

The insert recording will stop automatically near the zero point on the counter.

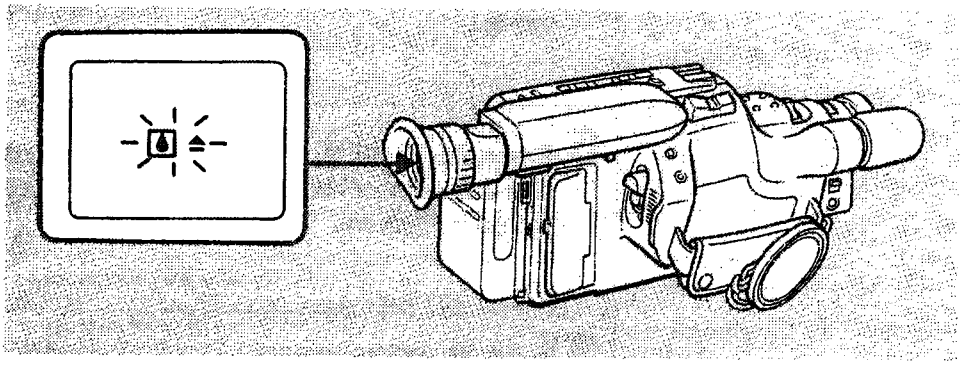
To change the end point Press ZERO MEM so that the ZERO MEM indication disappears, and operate again from step 2.

Maintenance Information

Moisture Condensation

If the camcorder is brought directly from a cold place to a warm place, moisture may condense inside the camcorder, on the surface of the tape or on the lens. In this condition, the tape may stick to the head drum and be damaged or the unit may not operate correctly. To prevent possible damage under these circumstances, the camcorder is furnished with moisture sensors. However, take the following precautions.

If moisture condenses inside the unit

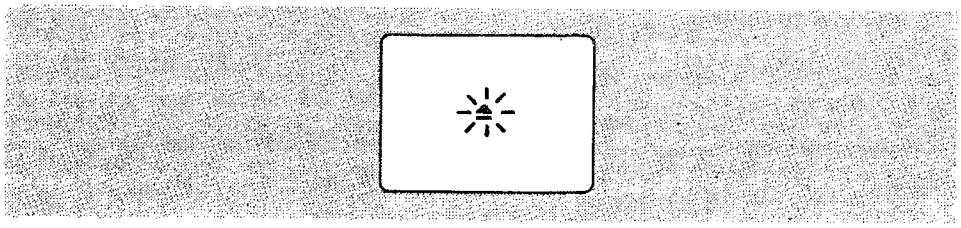


Moisture is present inside the camcorder when:

- The 💧 indication in the viewfinder blinks.
  When the tape is inserted, the ⏏ indication also blinks.
- Several beeps sound continuously for five seconds when the BEEP switch is set to ON and the tape is inserted.

In such cases, no function except for tape ejection will work.
Eject the tape, turn off the camcorder and leave it with the cassette holder open for at least 1 hour.
The camcorder can be used again if the 💧 indication does not appear when the power is turned on again.

If moisture condenses on the surface of the tape



Moisture is present on the surface of the tape when:

- The ⏏ indication blinks inside the viewfinder when the tape is inserted and a tape transport button (▷, ◀◀, etc.) is pressed.
- Several beeps sound continuously for about five seconds when the BEEP switch is set to ON.

In such cases, no function except for tape ejection will work.
Eject the tape and let the camcorder and the tape sit for at least 1 hour.
The tape can be used again if the ⏏ indication does not appear when the tape is inserted and a tape transport button is pressed.

If moisture condenses on the lens

No caution indications will appear, but the picture becomes dim.
Turn off the power and leave the camcorder unused for at least 1 hour.

Video Head Cleaning

To ensure clear picture, clean the video heads periodically

When playback pictures become noisy or hardly visible, the video heads may be contaminated.
In such case,

1 Clean the video heads with the Sony V8-25CLH cleaning cassette (not supplied), referring to its instructions.
2 After cleaning, check if the picture is clear by recording or playing back with an ordinary tape.
3 If the picture is still noisy, repeat cleaning. (Do not repeat cleaning more than 5 times.)

Caution

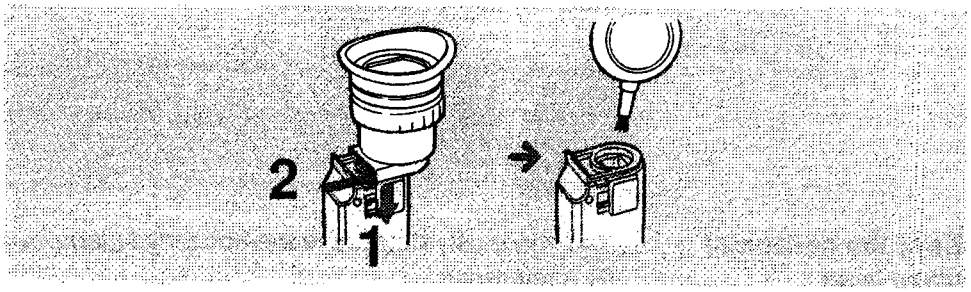
Do not use a commercially available wet-type cleaning cassette. It may damage the video heads.

Note

If the V8-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

Viewfinder Cleaning

Detach the eyecup as illustrated and clean the surface of the screen with a commercially available blower.



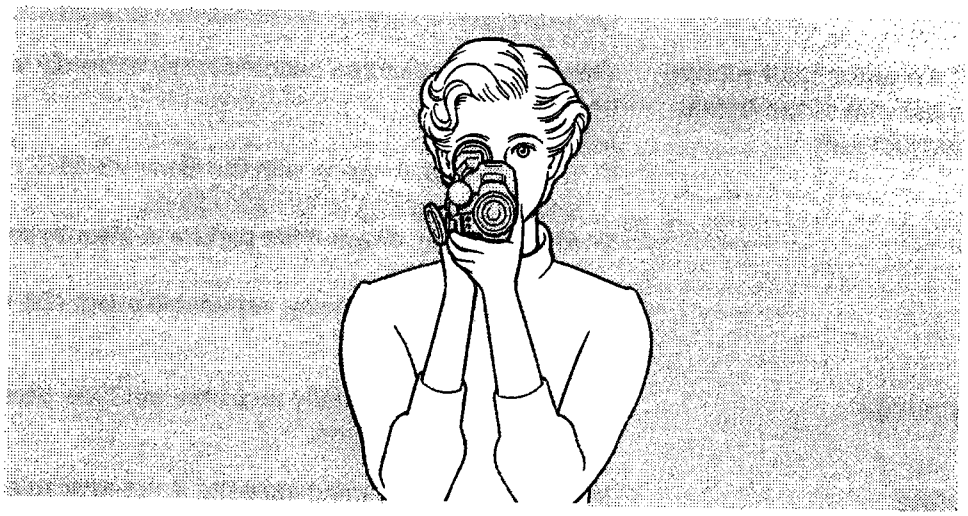
Tips for Better Camera Recording

How to Achieve Better Camera Recording

Take a good posture for shooting

For hand-held shots, it is important to hold the camcorder properly.

- Hold the camcorder firmly and secure it with the grip belt so that you can easily manipulate the camcorder with your thumb.
- Place your right elbow firmly against your side.
- Place your left hand under the camcorder to support it. When adjusting the focus manually, make sure the camcorder does not move.
- Stand opposite to the subject and let your feet take a comfortable stance.
- Place your eye firmly against the viewfinder eyecup.

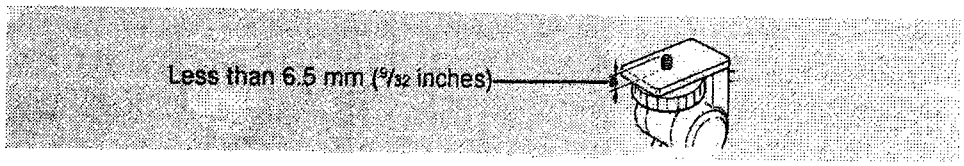


Use a tripod

If you have a tripod for a still camera, you can also use it with the camcorder. If a tripod is not available, try placing the camcorder on a tabletop or any other flat surface of suitable height.

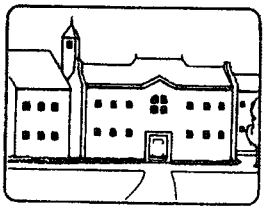
Caution

When attaching a tripod not manufactured by Sony, the length of the camera mounting screw must be less than 6.5 mm. Otherwise the screw may damage the inner part of the camera.



Keep the horizontal plane level

You can easily determine the horizontal plane by using the viewfinder frame as a reference.



Plan ahead

If you are going to edit the tape after recording, shoot the scene a little longer to make the editing easier.

If you are not going to edit the tape after recording, first record a title and then use the START/STOP button to make a smooth recording.

Lighting

Shoot with the sun behind you.
When the light source is behind the subject, or in the following situations, the subject will be recorded too dark and the background too light.

- The subject is indoors and there is a window behind the subject.
- Bright sources such as fluorescent or incandescent lamps are included in the scene.
- You are shooting a person wearing white or shiny clothes in front of a white background.
  In this case, the face will be recorded too dark.

Use video light in the dark

To get the best colors, you must maintain a sufficient light level.
Photography lamps or halogen lamps are recommended. For best results, use of Sony video lights are recommended since their weight and low heat output levels allow safe and direct connection to the camcorder.
Do not point the light at the camcorder. The high heat from the light may warp the casing of the camcorder.
For detailed instructions on proper use of the light, read its instruction manual.

Brightness levels

Using the following chart as a reference, take a few minutes to familiarize yourself with brightness levels to improve your recording technique.

Situation	Brightness	Condition
Snow-covered mountains Snow fields Sandy beach, clear day in summer	Unit: lux	ND filter recommended
Clear day, mid day (100,000 lux) Clear day, mid-afternoon (35,000) Overcast day, mid-day (32,000)	100,000	Normal recording
Overcast day, one hour after sunrise (2,000) Office lit by fluorescent lamps, near window (1,000) Clear day, one hour before sunset (1,000)	10,000	
Department store counter (500 – 700) Station wicket (650) Office lit by fluorescent lamps (400 – 500)	1,000	
Room lit by two 30 W fluorescent lamps (300) Subway station platform (300)	500 300	
Arcade at night (150 – 200)	100	
Theater lobby (15 – 35) Candlelight (10 – 15)	10	Video light recommended

Using Your Camcorder Abroad

Each country has its own electricity system and TV color system. Before using your camcorder abroad, check the following points.

Power Sources

You can use your camcorder in any country with the supplied AC power adaptor within 110 V to 240 V AC, 50/60 Hz.

Difference In Color System

You can view the playback picture in the viewfinder. However, if you want to view the playback picture on a TV, it must be an NTSC system based TV. Check the following list (in alphabetical order).

NTSC system countries
Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, The Philippines, U.S.A., Venezuela, etc.

PAL system countries
Australia, Austria, Belgium, China, Denmark, Finland, Germany (former West Germany), Great Britain, Holland, Hong Kong, Italy, Kuwait, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, etc.

PAL M system country
Brazil

PAL N system countries
Argentina, Paraguay, Urguay

SECAM system countries
Bulgaria, France, Guiana, Hungary, Iran, Iraq, Monaco, Poland, Soviet Union, etc.

Precautions

On operation

- Operate the camcorder on 6.0 V (battery pack), 7.5 V (AC power adaptor), or 9.0 V (alkaline batteries).
- For DC or AC operation, use the accessories recommended in this manual.
- Should any solid object or liquid fall into the casing, unplug the camcorder and have it checked by qualified personnel before operating it any further.
- Do not hold the camcorder by the viewfinder or the microphone.
- Avoid rough handling or mechanical shock. Be particularly careful of the lens.
- Keep the lens cap on the lens when not using the camera.
- Do not wrap up the camcorder and operate it since heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- Do not put the camcorder on the sand.

On care

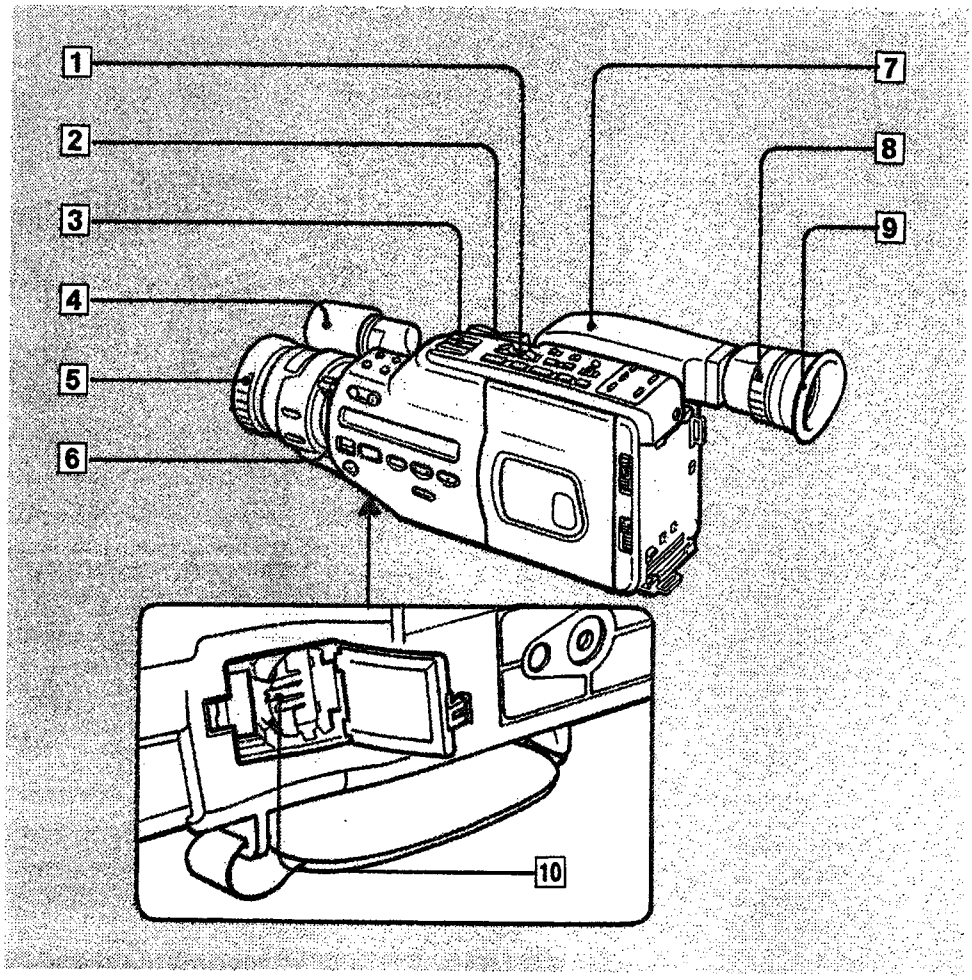
- When the unit will not be used for a long time, disconnect the power source and remove the tape. Periodically turn on the power, operate the camera section and player section and play back a tape for about 3 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on it, remove them with a soft cloth.
  Clean the camcorder body with a dry, soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent which may damage the finish.

Note on copyright

Television programs, films, video tapes and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the provision of the copyright laws.

Identifying the Parts

For details on the use of each part, refer to the pages indicated in the circle.



1 Power switch
CAMERA: for camera recording
VTR: for playing back or editing tapes
OFF: power off

2 Power zoom button ㊲ ㊴

3 Accessory shoe

4 Built-in microphone

5 Lens hood/focus ring ㉚ ㊴

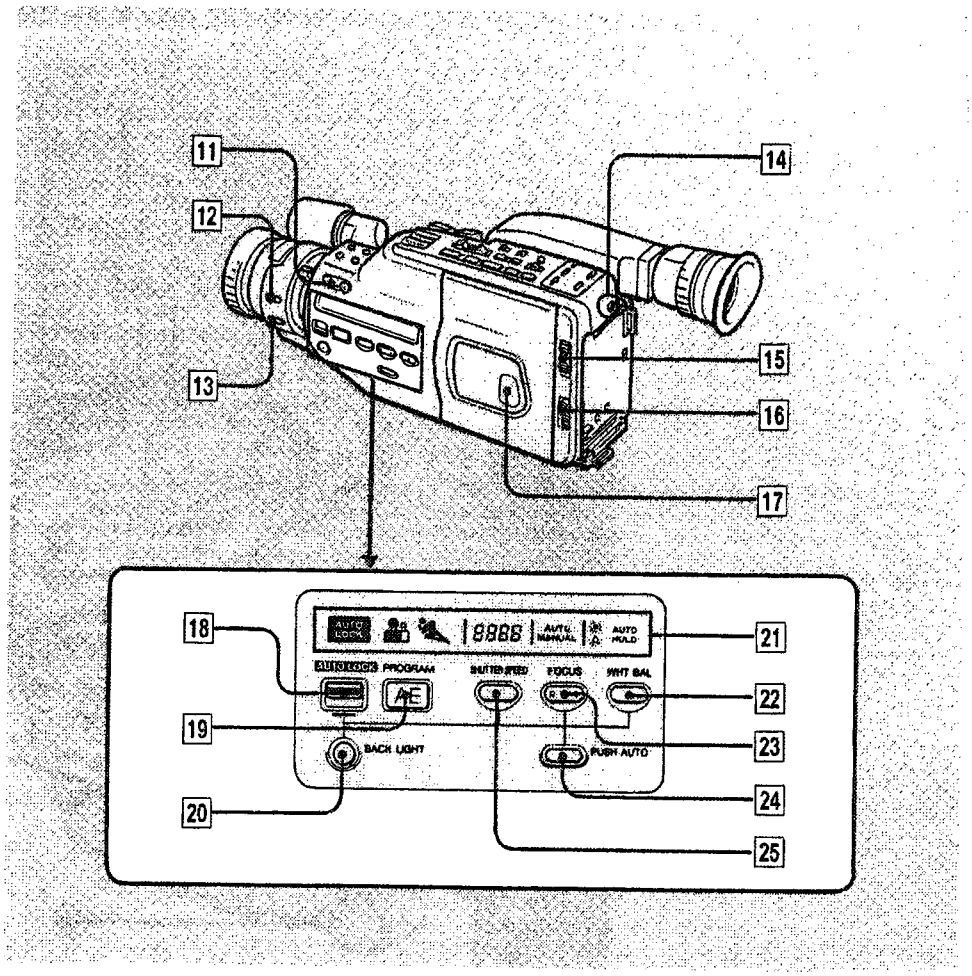
6 Zoom lever ㉚ ㊲

7 Viewfinder

8 Viewfinder lens adjustment ring ⑪

9 Eyecup

10 Lithium battery compartment ⑧



11 EDITSEARCH (and ⊜ recording review) buttons ㉓ ㉔ ㉕ ㉖

12 FADER button ㊵ ㊶

13 MACRO AF (macro autofocus) button ㊳

14 Camera recording/battery lamp ⑬

15 EJECT (cassette eject) knob ⑩ ⑯

16 BATT (battery eject) knob ⑦

17 Cassette holder

18 AUTO LOCK switch ㉘

19 PROGRAM AE (program auto exposure) button ㉟ ㊱

20 BACK LIGHT button ㉝

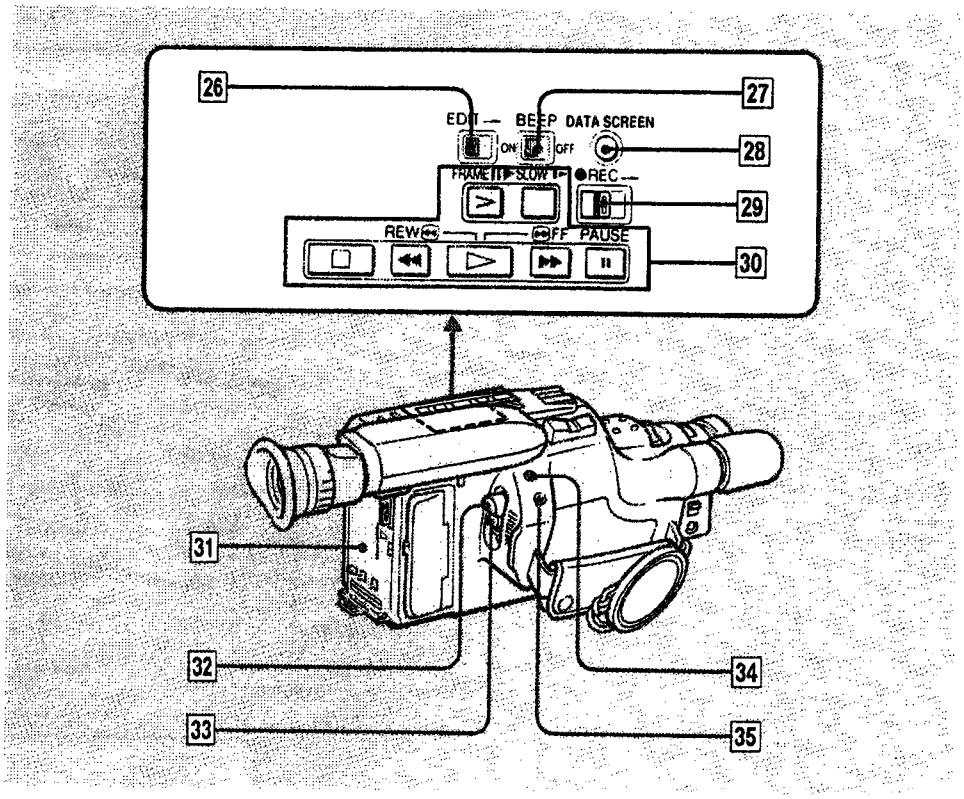
21 Display window ㉒

22 WHT BAL (white balance) button ㉜

23 FOCUS button ㉚

24 PUSH AUTO button ㉚

25 SHUTTER SPEED button ㉞



26 **EDIT switch** ⑰

27 **BEEP ON/OFF switch** ⑪

28 **DATA SCREEN button** ⑫

29 **● REC (recording) switch** ⑭

30 **Tape transport buttons** ⑫

▷	(playback)
▶▶ FF	(fast-forward)
◀◀ REW	(rewind)
□	(stop)
II PAUSE	(pause)
>/II▶ FRAME	(forward direction/frame-by-frame in forward direction)
▮▶ SLOW	(slow playback)

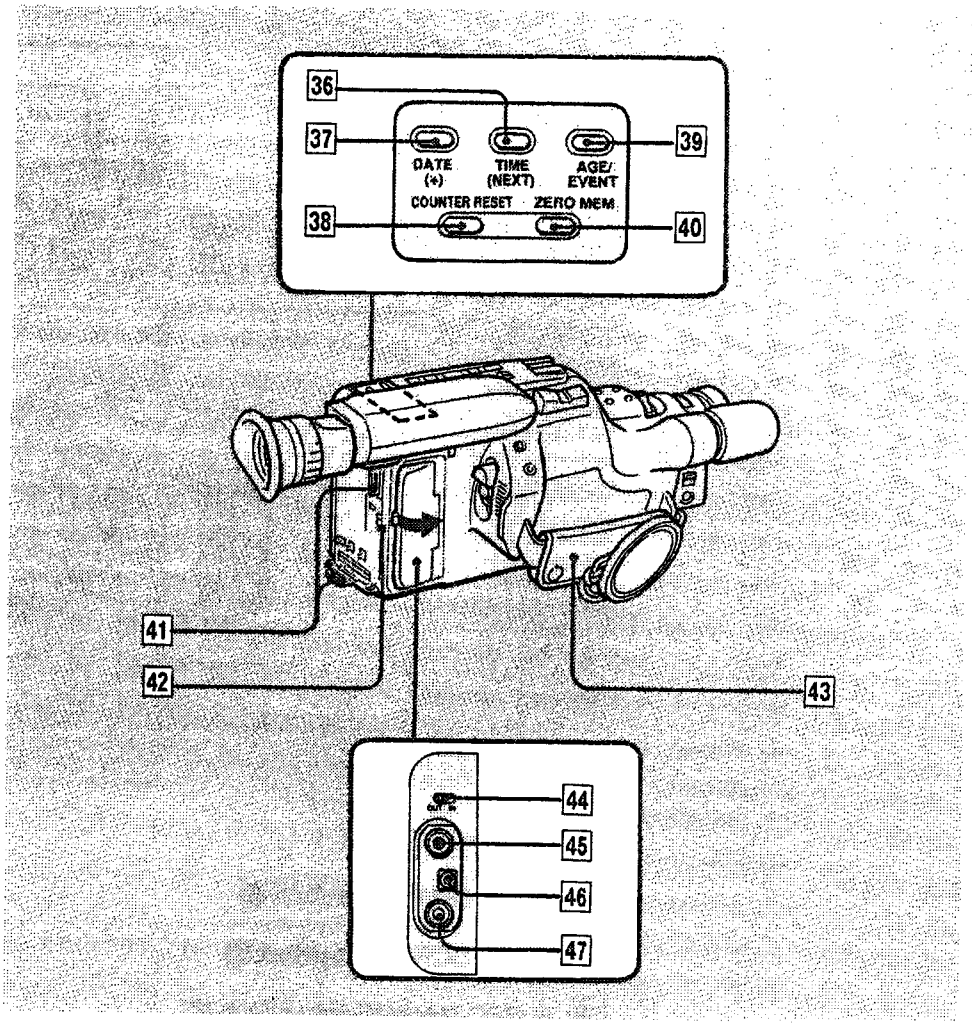
31 **Battery mounting surface** ⑦

32 **STANDBY switch**

33 **START/STOP button** ⑬

34 **REMOTE control connector (stereo mini-minijack)** ㉗

35 **Ω (earphone) jack (minijack)**



36 TIME (NEXT) button ⑨ ㉒ ㊼

37 DATE (+) button ⑨ ㉒ ㊼

38 COUNTER RESET button ㉕ ㊺

39 AGE/EVENT button ㊾

40 ZERO MEM (memory) button ㉕ ㊺

41 Hooks for shoulder strap

42 REMOTE COMMANDER ON/OFF switch ⑯

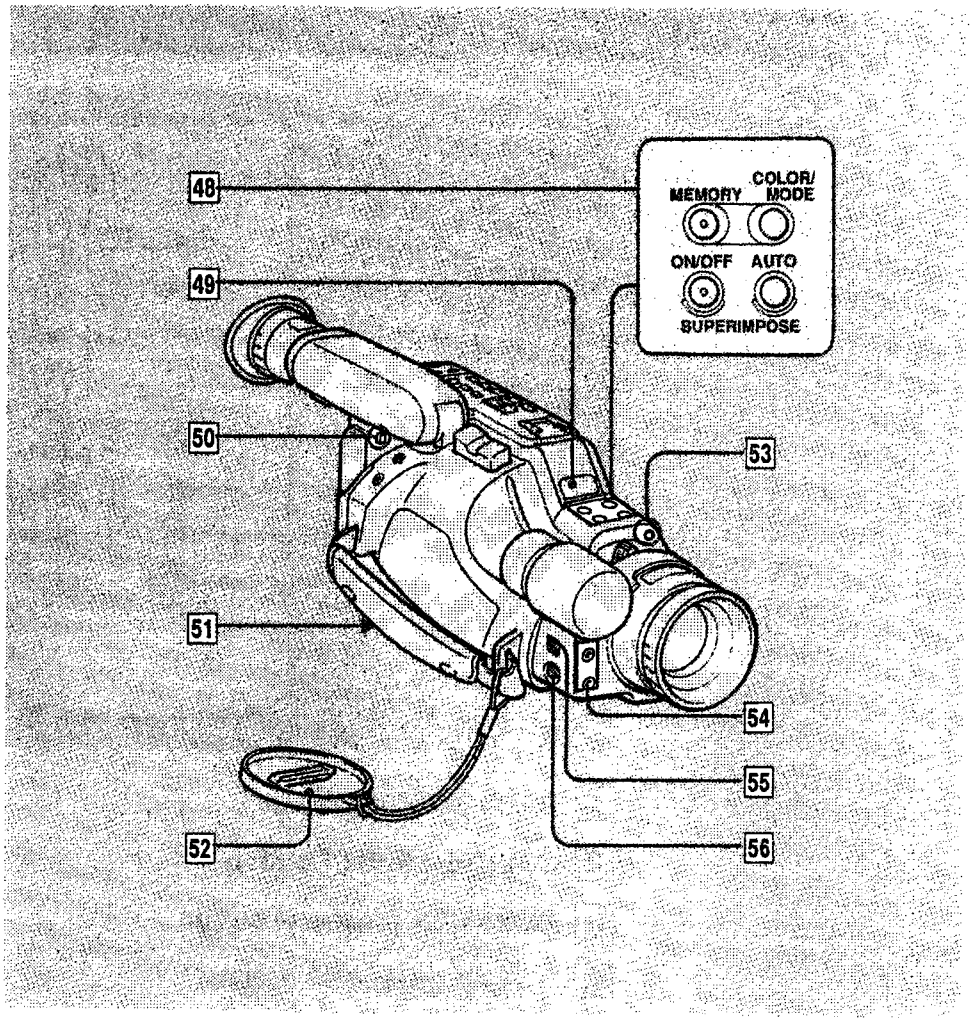
43 Grip belt ⑫

44 IN/OUT (video and audio input/output) selector ㊿ ㊹

45 AUDIO input/output jack (phono jack) ㊹

46 RFU DC OUT (RFU adaptor DC output) jack (special minijack)

47 VIDEO input/output jack (phono jack) ㊹



48 SUPERIMPOSE buttons (42)
MEMORY button
COLOR/MODE button
AUTO button
ON/OFF button

49 Remote control sensor (16)

50 PUSH SLIDE (viewfinder positioning) button (12)

51 Tripod receptacle (bottom)

52 Lens cap

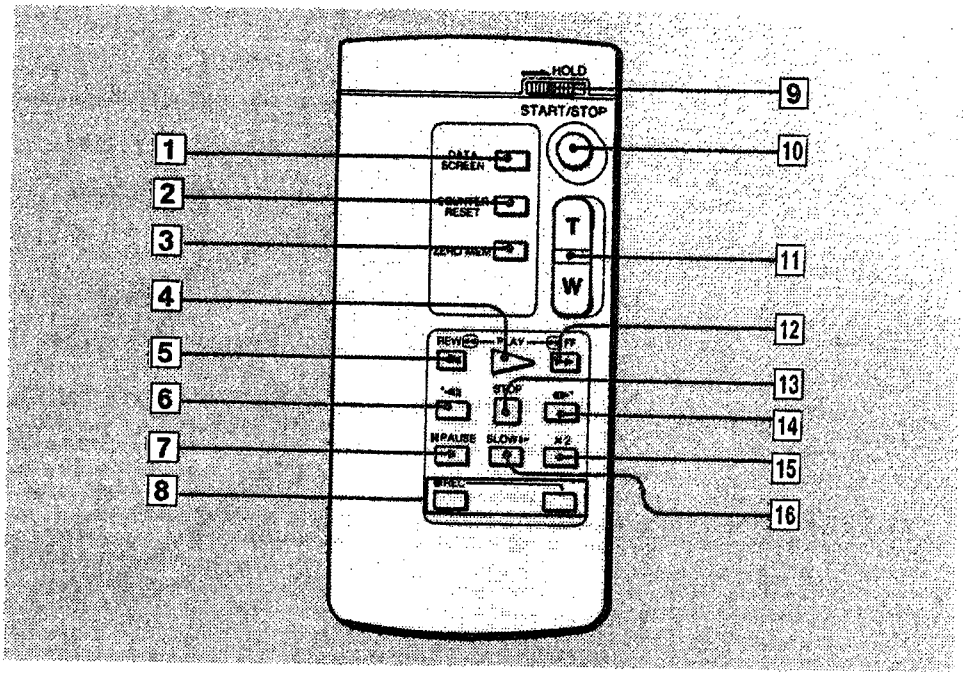
53 Camera recording/battery lamp (13)

54 MIC (microphone) jack (stereo minijack) and DC OUT (power output) jack (mini-minijack)

55 BUILT-IN MIC (microphone) switch (22)

56 REC (recording) START/STOP button (for low-position recording) (22)

Wireless Remote Commander



1 **DATA SCREEN button**

2 **COUNTER RESET button**

3 **ZERO MEM (memory) button**

4 **▷ PLAY (playback) button**

5 **◀◀ REW (rewind) button**

6 **< /◀II (reverse direction/reverse frame) button*** 52

7 **II PAUSE button**

8 **● REC (Recording) buttons**

9 **HOLD switch** 17

10 **START/STOP button**

11 **Power zoom button**

12 **▶▶ FF (fast forward) button**

13 **□ STOP button**

14 **> /II▶ (forward direction/forward frame) button** 52

15 **x 2 (double speed playback) button*** 52

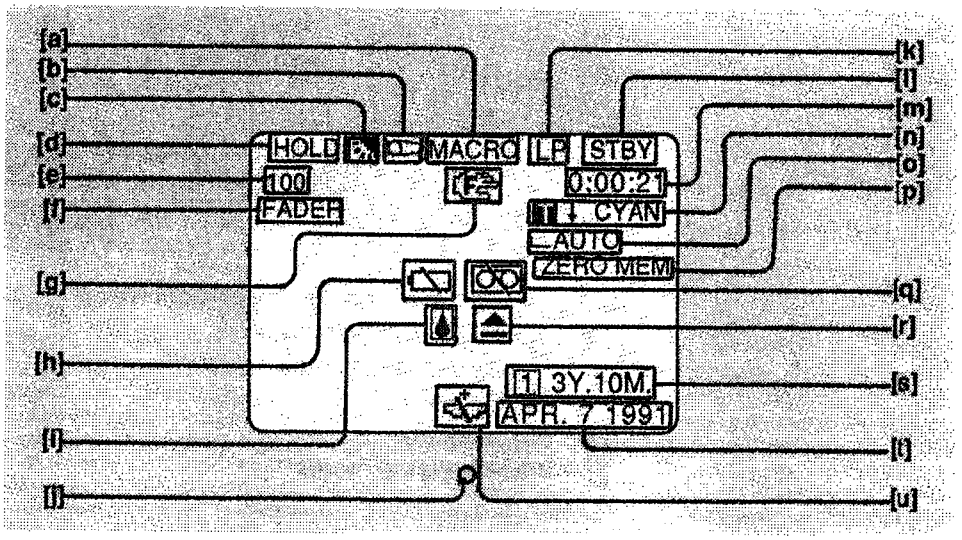
16 **SLOW I▶ (slow playback) button** 52

Note

The * indicates the functions which are operable only with the Commander.

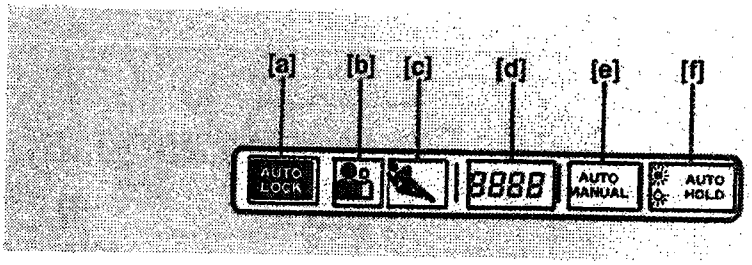
Indications inside the Viewfinder and the Display Window

Inside the Viewfinder



[a] MACRO AF is pressed. (MACRO)
[b] WIND is selected. ( )
[c] BACK LIGHT is pressed. ( )
[d] White balance mode. (, , HOLD)
[e] PROGRAM AE setting (,) or Shutter speed
[f] FADER is pressed.
[g] Manual focusing ( )
[h] "Exchange battery." ( )
[i] Moisture has condensed. ( )
[j] Lights up during recording.
When blinking: "Exchange battery or tape."
[k] Playback mode (LP)
[l] Tape transport mode
[m] Tape counter
[n] Title mode and color
[o] Auto superimpose (AUTO)
[p] ZERO MEM is pressed.
[q] "Exchange tape or no tape inside." ( )
[r] "Trouble has occurred" ( ) or "Clean video heads." ( )
[s] Age
[t] Date or time
[u] "Replace lithium battery" ( )

In the Display Window



[a] Appears in automatic adjustment mode
[b] Appears in portrait mode
[c] Appears in sports mode
[d] Shutter.speed
[e] Focus mode
[f] White balance mode

Troubleshooting

If any difficulty should arise during operation, go through the following table. Should the difficulty persist, unplug the unit and contact your Sony dealer or local authorized Sony service facility.

Symptom	Cause	Corrective actions
The power does not turn on.	The battery is not attached.	Attach the battery.
	The battery is used up.	Use a charged battery.
	The AC power adaptor is not connected to a wall outlet.	Connect the adaptor to a wall outlet.
The power turns off.	While being operated in the CAMERA mode, the camcorder has been in the pause mode for more than 5 minutes.	Push down the STANDBY switch, and push it up again.
	The battery is used up.	Use a charged battery.
The battery pack is quickly discharged.	The ambient temperature is too low.	—
	The battery pack has not been charged fully.	Charge the battery pack again.
The START/STOP button does not operate.	The tape is affixed to the drum.	Remove the tape with the cassette eject button.
	The tape is at its end.	Rewind the tape or use a new one.
	The POWER switch is set to VTR.	Set it to CAMERA.
	The tab on the tape is out (red).	Use a new tape or slide the tab.
The tape cannot be removed from the compartment.	The battery is used up.	Use a charged battery or the AC power adaptor.
No function except for tape ejection works.	Moisture condensation has occurred. (See page 60.)	Remove the tape and leave the camcorder for at least an hour.
The tape does not move when a tape transport button is pressed.	The POWER switch is set to CAMERA or OFF.	Set it to VTR.
	The tape is at its end.	Rewind the tape or use a new one.
The autofocusing function does not work.	AUTO LOCK was not set to the green position when recording.	Set AUTO LOCK to the green position.
	Shooting conditions are not suitable for autofocusing operation. (See page 29).	Set AUTO LOCK to the lower position and press FOCUS to adjust the focus manually.
The image on the viewfinder screen is not clear.	The viewfinder lens is not adjusted.	Adjust the viewfinder lens.
A vertical band appears when a subject such as lights or a candle flame is shot against a dark background.	The contrast between the subject and background is too high; the camera is not malfunctioning.	—
The color of the playback is not appropriate.	AUTO LOCK was not set to the green position when recording.	Set AUTO LOCK to the green position.
	Shooting conditions are not suitable for auto white balance operation. (See page 31.)	Set AUTO LOCK to the lower position and press WHT BAL to adjust the white balance manually.
The playback picture is not clear.	EDIT is set in the direction of the arrow.	Set EDIT in the opposite direction of the arrow.
	The channel or input for the camcorder is not selected on the TV.	Select correctly.
The picture is noisy.	The video heads may be contaminated.	Clean the heads using the Sony V8-25CLH (See page 61.) cleaning cassette.
When the TV is connected to the camcorder using the VIDEO/AUDIO jacks, the picture on the TV is not clear or moves vertically.	The IN/OUT selector is set to OUT.	Set it to IN.

If an indication blinks in the viewfinder screen or a caution lamp on the main unit blinks, check the following table.

slow blinking fast blinking

	Symptom		Cause	Corrective actions
Camera operation VTR operation	Battery lamp		The battery is weak.	Prepare a charged one.
	Battery lamp		The battery is used up.	Use a charged battery.
Camera operation	⏏ Battery lamp	Beeps	The tape is at its end.	Use a new tape.
	Battery lamp		The tape is near its end.	Prepare a new one.
			No tape is inserted.	Insert a tape.
	⏏	Beeps	The tab on the tape is out (red).	Slide the tab.
Camera operation VTR operation	or ⏏	Beeps	Moisture condensation has occurred.	Remove the tape and leave the camcorder for at least an hour.
	Caution lamp		The gap of the head is clogged.	Clean the head using the Sony V8-25CLH video head cleaning tape.
	⏏ Caution lamp	Beeps	Other troubles may occur.	Consult your nearest Sony dealer.
	blinks for 5 seconds in the viewfinder after setting the POWER switch to CAMERA.		The lithium battery is not installed. The lithium battery is exhausted.	Install a lithium battery with the battery pack or other power source attached. Otherwise, you must readjust the date, time, title and birth dates.
	The current time blinks for 5 seconds in the viewfinder after setting the POWER switch to CAMERA.		The lithium battery is weak.	Use a new battery.

Specifications

System

Video recording system
Rotary two heads, Helical scanning
FM system
Audio recording system
Rotary head, FM system
Video signal: NTSC color, EIA standards
Usable cassette: 8 mm video format cassette
Tape speed: SP mode: Approx. 1.43 cm (1/16 inch)/sec.
LP mode: Approx. 0.72 cm (1/32 inch)/sec. (playback only)
Recording time: SP mode: 2 hours (P6-120)
Playback time: SP mode: 2 hours (P6-120)
LP mode: 4 hours (P6-120)
Fast forward/rewind time
Approx. 6 min. 30 sec. (P6-120)
Image device: CCD (Charge Coupled Device)
Viewfinder: Electronic viewfinder (black and white)
Lens: Combined 8 x power zoom lens
f=8.5 to 68 mm (11/32 to 2 3/4 inches)
F 1.6 with macro
Filter diameter: 46 mm (1 13/16 inches)
Auto focus system: TTL
Color temperature: AUTO, HOLD
☆ (indoor) 3,200 K
☀ (outdoor) 5,800 K
Minimum illumination
2 lux
Illumination range: 2 lux to 100,000 lux (0.2 to 9294 footcandles)
Recommended illumination
More than 100 lux (9 footcandles)
Aperture correction: Automatic
With backlight adjustment

Input and output connector

Video input/output: Phono jack, 1 Vp-p, 75 ohms unbalanced sync negative
Audio input/output: Phono jack
Input: -7.5 dBs, input impedance more than 47 kilohms
Output: -7.5 dBs, (at output impedance 47 kilohms) impedance less than 1 kilohms
RFU DC OUT: Special minijack, 5V DC
Earphone jack: Minijack, 8-ohm impedance
Remote jack: Stereo mini-minijack
MIC jack: Minijack, -66 dBs, low impedance with 2.5 to 3 V DC output, impedance 6.8 kilohms
Microphone power output jack
Special minijack, 5 V DC

General

Power requirements
On battery mounting surface
6.0 V (battery pack)
7.5 V (AC power adaptor)
9.0 V (alkaline batteries)
Power consumption
6.2 W (camera recording) including the viewfinder
Installation: Vertically, horizontally
Operating temperature
0°C to 40°C (32°F to 104°F)
Storage temperature
-20°C to +60°C (-4°F to +140°F)
Dimensions: Approx. 111 x 139 x 330 mm (w/h/d) (4 3/8 x 5 1/2 x 13 in.)
Weight: Approx. 1.2 kg (2 lb 10 oz) excluding the battery and cassette
Microphone: Electret condenser microphone, monaural type

Wireless Remote Commander

Remote control system
Infrared control
Command mode: VTR 2
Power requirements
3 V DC, 2 size AA (R6) batteries
Dimensions: Approx. 57 x 20 x 120 mm (w/h/d) (2 1/4 x 13/16 x 4 3/4 inches)
Weight: Approx. 62 g (2 oz) (excluding batteries)

Design and specifications are subject to change without notice.

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If you have any question about this product, you may call:

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